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SYMPOSIUM.

TUBERCULOSIS INFECTION.

ROBERT KOCH, on March 24, 1882, in his famous communication "Ueber Tuberculose" to the Physiological Society of Berlin, announced his epoch-making discovery of the tubercle bacillus. In this and other countries the jubilee of Koch's great pronouncement is being celebrated. Koch will for all time occupy a foremost place among the world's benefactors and pioneers. He was born at Klausthal in Hanover, Germany, trained in the University of Göttingen, and after a strenuous life devoted to scientific research died at the age of sixty-seven on May 27, 1910. It has appeared to us that the most suitable way in which this JOURNAL can participate in the celebration of the fiftieth anniversary of Koch's great discovery is by arranging for a symposium on the still much-discussed problem of the infectivity of tuberculosis. Koch's penetrating researches enabled him to reveal the tubercle bacillus as the definite exciting cause of tuberculosis, but much further investigation is needed if all the factors influential in the production of tuberculous disease are to be fully recognized and ways and means found whereby we may secure the prevention, arrest, and ultimate extermination of this world-wide menace to human health and happiness. Through the co-operation of a number of representative workers in the field of tuberculosis inquiry we are enabled to present a series of communications which indicate the various views now existing in regard to the influences governing the infectivity of tuberculosis, and also concerning the various practical measures which are being taken to deal with the existing situation. These views go far to indicate the desirability of appointing an authoritative and representative body of tuberculosis experts which shall investigate all points relating to the infectivity of tuberculosis.

FROM S. LYLE CUMMINS,

C.B., C.M.G., M.D., LL.D.,

David Davies Professor of Tuberculosis, University College of South Wales;
Director of Research, Welsh National Memorial Association.

THE importance of the infective element in tuberculosis is masked by the fact that only a very few of those infected develop clinically recognizable tuberculosis, and that, of this small minority, the proportion that develops the disease soon after exposure is still smaller. Thus the association between cause and effect tends to be lost sight of or minimized unduly. There are certain generalities on which all will agree. Apart from an inconsiderable number of congenital cases in infants, every person suffering from tuberculosis owes his disease to infection. How, then, is the infection acquired? It results from inhalation of bacilli and also from swallowing of bacilli; the former being more important in pulmonary infection with "human" tubercle bacilli; the latter in human tuberculosis due to "bovine" tubercle bacilli. By carefully controlled and obligatory pasteurization of milk, we could eliminate all practical risk of "bovine" infection. Here the remedy is within our reach, but it is not adequately applied. The problem of stopping the inhalation and swallowing of "human" tubercle bacilli is much more complex, since the source of infection lies in infected human beings. To be dangerous, however, contact with an infected person must be intimate and prolonged. Even at the highly susceptible ages of infancy and childhood, it is only some of those exposed to "contact" with infected parents who develop recognizable tuberculosis early in life, although almost all become infected. The well-known facts of marital tuberculosis demonstrate that, in the adults of "tubercularized" communities, even prolonged and intimate contact and repeated infection may often be insufficient to produce recognizable disease. Yet every case of tuberculosis is suffering because of infection—infection which may have reached him through dried particles of sputum; fine bacillary dust from contaminated handkerchiefs, bed-clothes, garments, and skin; infected "droplets" from a coughing patient; or infected milk from a tuberculous cow. It is our duty to urge on the public the importance of sputum precautions, and on the Government the need for pasteurization of milk. It is our duty as epidemiologists to study far more closely the circumstances under which latent infection may become manifest as disease. But the problem of "infection" dominates the whole picture in tuberculosis prevention.

FROM ERNEST WARD,

M.D., F.R.C.S.,

Tuberculosis Officer for South Devon; Hon Secretary, Joint Tuberculosis Council.

We are all agreed on the necessity of infection with Koch's bacillus for the creation of tuberculosis, and we are all agreed that the patient's resistance to tuberculosis provides a second factor of almost equal importance in any measures aimed to eliminate the disease. In the treatment of a tuberculous individual, resistance alone matters, and steps to increase resistance are universally adopted; but in any preventive campaign there is ground for a legitimate difference of opinion, whether it is most feasible to prevent infection in a community or to raise the community resistance to tuberculosis. Experts are divided into "seedists" who attach importance mainly to infection, and "soilists" who believe that resistance is the most important factor; views are exchanged, but rarely, if ever, changed. Personally, I believe the facts controlling resistance are so uncertain, so little understood, and so difficult in application that it is best to concentrate on the prevention of infection. We may advise people to live healthily, to avoid fatigue and overwork, and not to worry, but how many are genuinely able to carry out these instructions? In dealing with infection three main sources must be recognized: (1) *From bovine sources*: To meet this, universal pasteurization of milk should be adopted pending the gradual detuberculization of our dairy herds. (2) *From the advanced open case*: Most of these are known, and the infection therefrom can be increasingly prevented. (3) *From the unsuspected case*: This source of infection is the most dangerous and difficult to meet; it can only be achieved by the cordial co-operation of general practitioners with the tuberculosis service. Another factor in infection with Koch's bacillus merits attention. Why does rest to joint or lung benefit our patients? Most experts will reply that it starves the bacillus, which then dies from inanition; but bacteriologists have informed me that the bacillus is definitely aerobic and dependent upon oxygen for life; and it is therefore probable that any measures which lower the blood supply to a focus gradually suffocate the organism. That the bacillus is markedly aerobic may explain its preference for lung tissue and the success of artificial pneumothorax, which diminishes the blood supply to a diseased lung, and of bodily rest, which has a similar influence to a less degree. If we bear this point in mind our treatment may become more effective; and experiments might usefully be directed to ascertaining by what means the bacillus may be rendered less able to utilize the oxygen presented to it, or the tissues which supply the gas less ready to part therewith.

FROM PATRICK HEFFERNAN,

M.D.,

Tuberculosis Officer, Derbyshire County Council.

The position of the bacillus of Koch as the causative agent is beyond question. The evidence for the existence of a pre-bacillary filter-passing stage or a post-bacillary mycelial stage is, so far, unconvincing. But one must not attempt to anticipate the future. Possibly the biologists of the year 2032 may smile to recall the limited views of the bacteriologists of today. The routes of implantation in the case of primary infection are well known. With insignificant exceptions the rule holds that infection with the human type of bacillus is mainly through the respiratory tract, and infection with the bovine type through the alimentary tract; while the tonsils, occupying a situation common to both tracts, impartially snare both types. The Lübeck tragedy has demonstrated that fatal tuberculosis can be set up by subcutaneous inoculation of human beings with bacilli grown on artificial media. It is generally accepted that an immediate constitutional result of primary infection is the establishment of Koch's phenomenon, "allergy," which establishes a biological distinction between the infected and the non-infected *qua* tuberculosis. The former are "sensitized," the latter are not. This sensitization enables us to detect (with, however, an appreciable margin of error) the occurrence of previous infection in the individual, by the Mantoux test. The application of this test to large masses of population at all ages has shown that, in the conditions which are now usual in Western Europe and North America, the bulk of the living population have suffered primary infection with tubercle before reaching adult life. Opinion, however, is not equally unanimous regarding the steps in, and the factors which determine, the further development of the infection into the manifold types of clinical disease; the establishment of immunity or resistance, the nature, degree, and duration of that immunity, and the relation between immunity and allergy. As these matters have a direct bearing on the problem of the infectivity of the disease, it is necessary to refer to them briefly. Ranke's description of pulmonary tuberculosis as being, like syphilis, a disease of three stages appears sound, provided that the stages are taken as existing in, so to speak, "space-time" rather than necessarily in chronological order. The conception fits in well with the work of Opie, McPhedran, and Gardner. According to this conception the "primary" stage of tuberculosis is

unaccompanied by symptoms. The secondary stage may, however, take an acute febrile form, manifesting itself as a localized infection such as tuberculous pneumonia or a generalized form such as miliary tuberculosis. The acute pulmonary tuberculosis of adolescents is an example of the secondary stage, so is the acute form which occurs in races infected with the disease for the first time, as in the case of the Indians of Saskatchewan, the Senegalese troops in France, the Kalmucks in Russia, and, for the matter of that, the young girls from the Western Highlands who come to work in Glasgow. In immunized people with high "resistance," however, the secondary stage may be passed with only vague feelings of ill-health, and if conditions are favourable, the inflamed and infiltrated area may clear by resolution, as in simple pneumonia. The fibro-caseous tuberculosis of adult life is the tertiary stage of tuberculosis, supervening when the secondary stage fails to resolve, but does not prove fatal. Primary tuberculosis may go on rapidly to secondary in individuals with low resistance. But the usual course is that the primary "chancre" heals. Sometimes, however, the focus persists, quiescent but unhealed, in which state it is likely to be reactivated by a massive superinfection, or even by an overdose of tuberculin incautiously administered. Many cases of tuberculosis which occur in adolescents and young adults in this country are believed to arise in this manner. While, therefore, allergy may not be an unmixed blessing, there is little reason to doubt that the decline in the tuberculosis death-rate, and in the incidence of tuberculous disease (as distinguished from tuberculous infection), is mainly due to two factors: (1) The lessening of exposure to massive, virulent, and prolonged infection, and (2) the increased immunity or resistance of the population. Factor (1) requires no elaboration. But controversy still persists regarding factor (2). The evidence of immunity is overwhelming. As Metchnikoff pointed out long ago, the figures for conjugal tuberculosis can only be explained on the hypothesis of an immunity increasing with age, and therefore probably acquired. The work of Bordet, Guérin, and Calmette on acquired immunity is convincing. Nor should we forget the warnings uttered by a great clinician who has left us, the late Dr. Clive Riviere. Our knowledge of the factors which govern immunity and resistance to tuberculosis is still very imperfect. The astounding discovery that certain foods contain an anti-infective vitamin has recently been made. Who can foretell the developments that the future may bring forth? Apart from acquired immunity, is there such a thing as constitutional or racial immunity? Amongst the Nordic races, are the red-haired, freckled people doomed to extinction, while the pigmented and the "platinum blonds" survive? Did the poet Richard D'Alton Williams—himself a medical man—state a great truth when, nearly a hundred years ago, he wrote:

"From a Munster vale they brought her,
 From the pure and balmy air—
 An Ormond peasant's daughter
 With blue eyes and golden hair.
 They brought her to the city,
 She faded slowly there ;
 Consumption has no pity
 For blue eyes and golden hair " ?

FROM S. VERE PEARSON,

M.D., M.R.C.P.,

Physician to the Mundesley Sanatorium.

In reference to the Infectivity of Tuberculosis there are two dangers which today are not sufficiently overcome by any dissemination of our increased knowledge of recent years. Since the discovery of Koch fifty years ago our realization of factors in the causation of tuberculosis has increased very much. The pathogenesis of pulmonary tuberculosis is understood in a very different manner from what it was even twenty years ago. Nevertheless, at the present time too much attention is still given to the tubercle bacillus itself. There is consequently an unduly exaggerated fear of infection amongst adults. Because Koch's great discovery placed tuberculosis without question among the infectious diseases many people shun like lepers, patients and ex-patients known to have or to have had tuberculosis. It is particularly so in the case of sufferers from pulmonary tuberculosis. Yet we know that this malady in an adult is not infectious, at all events to adults, in the same way as other contagious diseases are infectious; and that the precautions which sometimes have to be taken are very simple. The exaggerated fear is founded on a misunderstanding and upon a paucity of knowledge of the facts. It quite definitely results in harm in many directions. The Pasteurization of milk has done a great deal to prevent disease, especially amongst infants; and it has undoubtedly helped, amongst other things, to lessen the incidence of tuberculosis of bovine origin very materially. But these achievements must not allow any slackening of the efforts towards a higher ideal—namely, that of a clean milk supply. This is a second danger present today, and it is to be hoped the BRITISH JOURNAL OF TUBERCULOSIS, which has now been carrying on its good work for a quarter of a century, will lend its aid to minimize these two risks connected with tuberculous infection.

FROM A. STANLEY GRIFFITH,

M.D.,

Member of the Scientific Staff, Medical Research Council.

The editor has asked me for a brief statement on the Infectivity of the Bovine Tubercle Bacillus for Man. Investigations in Great Britain have shown that bovine tubercle bacilli can cause every form of human tuberculosis and give rise to tuberculous lesions in every organ and gland of the body. The highest proportion of bovine infections was found in children under five, and in those cases where the channel of entry of the bacilli was the alimentary tract. For example, in children under five with cervical gland tuberculosis the percentage of bovine cases was 85. In bone and joint tuberculosis, a form of the disease which follows respiratory or alimentary infection, the percentage of bovine infections was 27 in children under five, and progressively diminished with advancing age. These facts sufficiently indicate the danger of giving children raw milk from untested herds. Even in cases of phthisis pulmonalis the bovine bacillus has been found in a proportion of cases—namely, in 4 of 492 cases in England and in 21 of 548 cases in Scotland. It is remarkable that in this as in other forms of human tuberculosis the incidence of bovine infections is higher in Scotland than in England.

FROM J. MIDDLETON MARTIN,

M.D., D.P.H.,

County Medical Officer of Health for Gloucestershire.

In the fifty years which have elapsed since Koch reported his discovery of the tubercle bacillus, much experience has been gained as to the nature of tuberculosis, and accepted views have been varied gradually to suit the available knowledge at any one time. A very important factor was the discovery that so large a proportion of the population in this, among other countries, is infected with the tubercle bacillus, to such an extent, as it is now agreed generally, that the term "universal" has been applied to the infection. In the early years of the present century there was a fierce controversy over the types of the tubercle bacillus, and a Royal Commission was appointed: they reported in 1911 that they could not exclude the possibility of a change of type in natural conditions, and that tuberculosis was throughout one and the same disease. To overcome the difficulty arising from the fact that up to recent years the type of organism reported to be found in pulmonary tuberculosis was invariably human, an explanation had to be found. The explanation put forward and now generally accepted is that, while many persons have bovine tuberculosis in early life with or without symptoms, their resistance can be overcome by massive

doses of human bacilli later in life, and that pulmonary tuberculosis is due to such reinfection. Is there a more appropriate way of celebrating the Jubilee of Koch's epoch-making discovery of the tubercle bacillus than taking stock of the whole situation, and considering whether or not our present views should not be varied by recent knowledge of proved facts relating to tuberculosis?

FROM DONALD P. SUTHERLAND,

M.B., B.S.,

Senior Tuberculosis Officer for the City of Manchester; Clinical Lecturer in Tuberculosis in the University of Manchester.

The discovery by Koch of the tubercle bacillus, and his classical confirmatory experiments, revealed for the first time the agent to which the recognized infectivity of tuberculosis was due. The causative organism being found, preventive and remedial measures were soon suggested to assist in reducing the incidence of the disease and to check its progress when already established. The various laws of hygienic living now generally advocated, the isolation of the infected individual, the destruction of the expectorated material containing the bacilli, and the periodical cleansing of the patients' homes, all had as their basis the attempt to reduce infection. Public Health Departments took action to promote preventive measures, and in Manchester the late Dr. James Niven initiated one of the earliest schemes in the country. The development of anti-tuberculosis schemes in the last twenty years needs no elaboration in this article, but it has followed as a natural expansion of the earlier ideals already mentioned. The universality of infection and the high rate of natural recovery bring forward into prominence the great importance of resistance factors, about which we know far less than we do about infectivity. Further efforts should still be made to limit gross infection both directly and indirectly. Some redistribution of population, and better methods of transport to avoid the gross overcrowding in inadequately ventilated trams, buses, and trains are called for. The dangers of infected milk have been generally dealt with, and a scheme for the pasteurization of the entire city's supply has recently been approved by the Manchester City Council. Attention might, however, be directed to other food dangers arising from the number of open tuberculous cases working as cooks, waitresses, toffee-makers, etc. In another direction, the more extended provision of colony employment in workshops associated with sanatoria and hospitals is desirable for these active cases of pulmonary tuberculosis who cannot and should not return to ordinary industry by reason of their disease. Periodical examination of workers, especially those engaged in occupations where a high incidence of tuberculous disease exists, has been advocated. And together with these particular and general

activities there should be pursued further intensive research into those conditions, whether individual or other, which are concerned with resistance to and recovery from the disease, about which at present so little that is definite is known.

FROM FRANCIS J. BENTLEY,

M.D., M.R.C.P., D.P.H.,

Divisional Medical Officer of the London County Council.

It is remarkable that fifty years after Koch's momentous discovery there are still great differences of opinion existing regarding the infectivity of tuberculosis. Most workers in this field of medicine are agreed that at least two factors determine the onset of the disease: (1) Koch's bacillus, and (2) the resistance of the individual. But what constitutes this "resistance" is as yet little understood, and controversy still rages about the importance of infection. One cannot deny the fact that, at any rate in children, those in contact with a known case of pulmonary tuberculosis in the household are more liable to develop this disease, and indeed do develop it more frequently, than children from homes in which there is no such infection. Contacts, however, are a relatively small group of the population, and the non-contacts, though incurring less risk, provide by far the greater number of sufferers. I contend that if we could be 100 per cent. successful in protecting every child in every *known* tuberculous household we would still have failed to touch the greater part of the problem arising from the non-contact group. Whilst then "infection" is important, it is by no means all-important, and in tuberculous disease, where many are infected yet relatively few affected, other factors, it would seem, must operate more powerfully. Further study should be directed towards the biochemical side, and those rare families in which, despite care, practically every member becomes tuberculous might be investigated. An enquiry into modern social conditions in connection with the present problem of the disease in young adult females might also be usefully undertaken.

FROM CUTHBERT D. S. AGASSIZ,

M.C., M.D., M.R.C.P., D.P.H.,

Medical Superintendent, High Wood Hospital for Children, Brentwood, Essex.

Tuberculosis is usually classified as one of the infectious diseases, but it would seem that it would be more correct to classify it as a contagious disease. Recent work that has been done on the Mantoux test shows that among the childhood population under ten years of age not living in a household in which there is a case of open pulmonary tuberculosis the incidence of infection as judged by this test, and not by any clinical evidence of the disease, is only 30 per cent.—that is to

say, among the most susceptible portion of the population—whereas among the childhood population under the same age constantly exposed to an open case of pulmonary tuberculosis the incidence is 75 per cent. In a recent series of cases of pulmonary tuberculosis in children with tubercle bacilli in the sputum I found that a history of direct contact occurred in at least 45 per cent. of the cases. Again, the number of children who drink tubercle-infected milk must be large, but only a small proportion become infected. It is apparently the constant, frequently repeated massive doses of tubercle bacilli that constitute the infectiousness of the disease. Where there is not this massive dosage, or where adequate steps are taken to prevent the spread of infection, the actual infection is small, so small as not to be clinically detectable in the majority of cases, and this can be dealt with. I am led, therefore, to believe that the infectivity of tuberculosis is not great for human beings; what constitutes the danger is the inadequacy of the measures taken to prevent infection.

FROM FREDERICK HEAF,

B.A., M.D., M.R.C.S., L.R.C.P.,

Medical Superintendent, Colindale Hospital, Hendon, London.

In order to arrive at any conclusion concerning the infectivity of tuberculosis, it is first necessary to remember a few indisputable facts: (1) Tuberculous lesions are caused by the *Bacillus tuberculosis*; (2) children are born non-tuberculous; (3) tuberculous lesions, active or inactive, can be demonstrated in most bodies at autopsy; (4) 80 per cent. of children by the age of fourteen give a positive tuberculin test; (5) most cases of chronic pulmonary tuberculosis show Ghon foci, and the more chronic the disease the more likely are they to be present. (6) There are relatively few deaths from tuberculosis between the ages of six and fourteen years compared with other age periods; (7) living tubercle bacilli persist in old lesions; (8) there is an increase in mortality during periods of privation and strain; (9) Koch's phenomenon must be remembered; (10) there is a frequency of increased activity due to sudden increase of work in patients under ideal conditions. From this evidence it would appear that the child becomes infected at an early age, depending on its environment, and offers a good resistance to the tubercle bacillus. If the infecting dose is massive, or frequent, the child will succumb to an acute or sub-acute tuberculosis, but if the dose is small and infrequent it will resist it, and acquire a definite immunity. We know that most children are infected by the tubercle bacillus; it is certain that the human body is continually reinfected during adult life, as contact with the organism does not cease with childhood. The immunity acquired at a young age is increased by these reinfections if they are small, and if the body is obtaining the necessary nourishment

and conditions for normal healthy growth. If these are denied, then foci in the body containing live T.B. will give rise to active and progressive lesions. Similarly if the reinfecting dose in adult life is greater than a certain amount, or occurs too frequently, the limits depending on the nutrition and presence of other pathological conditions, then active tuberculous lesions will develop. Briefly this means that, providing the child survives the initial infection, it is difficult to cause active tuberculosis in the adult by exogenous reinfection unless the body is poorly nourished, or the dose is large and frequent. Increased activity of the lesion can be caused also by overstrain and malnutrition without exogenous reinfection.

FROM WILLIAM C. FOWLER,

M.D., B.S.,

Medical Superintendent, Pinewood Sanatorium, Wokingham, Berks.

Twenty years' experience in tuberculosis work leads me to the conclusion that tuberculosis in human beings is almost as much a question of allergy as of infection by the tubercle bacillus. If a child's allergic reactions develop normally to minimal doses of infection, he will build up a resistance against the disease and will produce a positive Von Pirquet reaction. If the allergic reaction fails to develop normally, his future will always be in danger, and will depend on the amount and distribution of the tubercle bacilli that he encounters in everyday life. He may die in six months of meningitis, or in six years of bone and joint disease, or in sixteen years of pulmonary disease. He belongs to the class of feeble or negative reactors to Von Pirquet's test. If his allergic reactions develop in some perverse fashion, he may be the victim of some such disease as asthma, with or without tuberculosis. In crowded communities infection is almost inevitable, and the incidence of the disease in any given group will depend on the age at which mass infection is first met, the size of the dose, and the allergic reactions of the individual members. This last factor may of course be markedly influenced by heredity, or by diet deficiency, or possibly by hygienic conditions. Any or all may be combined, but I feel convinced that an individual who gives a feeble or negative reaction to one or other of the tests, such as Von Pirquet's, is a potential victim of disease by exogenous infection at any age and needs careful protection and observation. A nurse who is not a good reactor should not be occupied in nursing advanced cases of tuberculosis; nor should a marriage be sanctioned between a case of tuberculosis, even if well arrested, and a partner who gives a poor or negative Von Pirquet reaction. Of 508 consecutive cases of married consumptive women admitted to Pinewood Sanatorium, 9 per cent. had lost their husbands from tuberculosis.

Of 1,215 consecutive cases of women over sixteen, married or single, there were 22 per cent. in which either father, mother, or both parents had died from tuberculosis. After allowing for statistical adjustments necessary in dealing with such figures, it is clear that adult exogenous infection does occur in at least 15 per cent. of cases exposed to infection. Endogenous infection may be explained by a loss or diminution of the allergic reaction due to time or debilitating factors of different kinds combined with the sudden and extensive release of infection from a primary or secondary focus. Parental infection of young children is undisputed. Of the above mothers 7·4 per cent. had tuberculous children. This figure is probably too low, because cases of tuberculous meningitis are often given as deaths from "convulsions" by the mother when a history is taken. Summarizing the family histories of these 1,215 consecutive adult parents, 723 or 59·5 per cent. give a history of direct contact infection in the family.

FROM THOMPSON CAMPBELL,

M.D., C.M.,

Medical Superintendent, Middleton-in-Wharfedale Sanatorium, Ilkley; late
Chief Clinical Tuberculosis Officer, West Riding of Yorkshire.

After thirty years' close daily association with tuberculous patients, my view regarding the infectivity of pulmonary tuberculosis is that its degree lies mid-way between (1) the virulence represented by the six-foot radius figured in an old poster of the National Association for the Prevention of Tuberculosis, and (2) the comparatively innocuous limit of the purely endogenous theory now being widely promulgated. I believe that the endogenists are in error in holding that as a rule infection spreads from hilum glands into the pulmonary tissues: it would be as correct to state that carcinoma of the mamma has extended from a site in the axillary glands. Radiologists were originally responsible for the misreading of their radiographs, taking it that radiation of opacities from the hilum upwards and outwards towards the apex, or downwards and outwards towards the base, represented an extension of disease from the centre to the periphery, whereas the contrary is the case, the hilum glands being the filters of the lymphatic channels. Again, my observations do not support the views that infection with tubercle bacilli of the human strain in the majority of cases takes place during childhood, and that the bacilli remain quiescent for years, awaiting reactivation in adult life. On the contrary, I have found that in a large percentage of children—definitely labelled as suffering from tuberculosis, and sent to Institutions for treatment—the disability is chronic alveolar catarrh associated with malnutrition. The tuber-

culosis which is stated to be commonly and widely implanted in childhood is, in my opinion, of the bovine strain, and affects bronchial and other glands, but does not ordinarily lead to definite pulmonary disease, the degree of infectivity of bovine bacilli being, as one would expect, milder, coming from a different host. Direct infection between adults is, in my view, common, and as an instance I may mention a recent experience. In a visit to an average working-class dwelling I found a man, aged sixty-seven, dying from pulmonary tuberculosis; his son, aged thirty-six, who had nursed him as long as he was able, infected to the extent of Stadium III.; and his daughter-in-law, aged forty-five, living in the same house, showing definite signs of an early involvement of the lungs.

FROM W. M. CUMMING,

M.D., Ph.D., D.P.H.,

Medical Superintendent, Bradford City Sanatorium, Grassington, Yorkshire.

Tuberculosis is a bacterial and therefore an infectious disease, but on account of the practically universal tuberculization of civilized populations its infectivity (in the sense of ability to produce disease) is largely governed, in the adult at least, by the balance between dosage and individual acquired immunity. This latter is generally high, as indicated, for example, by the rarity of marital tuberculosis. The two theories of exogenous and endogenous superinfection are not irreconcilable. Brought up in the former, converted to the latter, the writer is now convinced that both are necessary to explain all cases. As illustrating the one extreme, the writer has under observation a small group of cases of pulmonary tuberculosis due to the bovine type of the bacillus in which there is definite clinical evidence of a *previous* glandular infection. That the pulmonary lesions in these cases are due to exogenous superinfection seems unlikely. On the other hand, most tuberculosis workers must have met with "outbreaks" of pulmonary tuberculosis among operatives in the same workshop, office, etc. Generally, in such outbreaks, the probable primary case is the only one to give a family history of tuberculosis. To explain the secondary cases as other than examples of exogenous superinfection is difficult. That there remain other undiscovered factors seems likely. The studies of Petroff and his colleagues with "R" and "S" colonies of the tubercle bacillus suggest the possibility of greater variations in the virulence for man of the human type of the bacillus than is so far demonstrable in experimental animals. How helpful in explaining the outbreaks mentioned above! Further, the single-cell studies of Kalin offer more convincing evidence of a filterable phase of the tubercle bacillus than do the conflicting results of direct experiments.

FROM HUGH G. TRAYER,

M.B., D.P.H.,

Medical Superintendent, Baguley Sanatorium, near Altrincham, Cheshire.

My communication relates to the Infectivity of Tuberculosis in Relation to a Sanatorium Nursing Staff in a sanatorium with a turnover of 900 to 1,000 patients per annum and an average death-rate of 18.95 per cent. In the last ten years the number of nursing staff who were passed medically fit and who served one or more years was 116. Of this number half were probationer nurses who were between the ages of eighteen to twenty years. Fifty per cent. of these probationers proceeded to a general hospital to complete their training, and at the time of writing none of these has developed tuberculosis. There can be no doubt that even under the excellent hygienic conditions prevailing in a modern sanatorium, the nursing staff caring for dying cases of pulmonary tuberculosis must from time to time receive considerable doses of tubercle bacilli, and, in the case of these probationer nurses, at a most susceptible age. Considerable attention is devoted to the maintenance of the general health of all the staff, and the freedom of the staff from the subsequent development of tuberculosis does emphasize that the infectivity of the tubercle bacillus loses much of its danger in the face of high physical fitness.

FROM BRICE RICHARD CLARKE,

M.D., B.Ch., B.A.O.,

Medical Superintendent of Forster Green Hospital for Consumption,
Belfast, Ireland.

Robert Koch made a contribution of supreme importance to science when he demonstrated that the *Bacillus tuberculosis* is the pathogenic organism which causes tuberculous disease. Many people were convinced that tubercle was an infectious disease before Koch's discovery, and it is interesting that some serious students of tuberculosis hold still that infection plays a minor rôle in the development of the clinical disease. Koch's discoveries have widened the circle of our ignorance, and a whole group of new problems remain to be solved in connection with the relation that tuberculous infection bears to tuberculous disease. There are those who hold that genetic factors such as individual and racial immunity are of importance. Also there are many environmental factors besides the fact of infection with the bacillus of Koch which favour or hinder the development of tuberculosis. The fact of infection is of supreme importance, but must be considered in relation to the age of the infected subject, infecting doses, and the number of times the infection is repeated. I think it was Virchow who said that the important question is, "How much tuberculosis?"

FROM ANDREW TRIMBLE,

M.B., D.P.H.,

Chief Tuberculosis Officer, County Borough of Belfast.

In a short contribution like this it is only possible to write in general terms, and without submitting substantial proofs. It is generally admitted that by fifteen years of age about 75 per cent. of the population react to tuberculin, and amongst "contact" children the percentage is much higher. Infection takes place in the child world of the home, the school, and the street. The immunity conferred by child infection is shown by the comparatively low percentage of adolescent and adult *clinical* tuberculosis amongst these reactors. Further, from the records of various observers, I find that of 2,882 married couples in whom one or other partner was tuberculous, about 5 per cent. only of the apparently non-infected "consorts" developed tuberculosis; presumably the remaining 95 per cent. were fortified by a previous immunizing infection. It would seem that the clinical development of tuberculosis is dependent upon: (1) The virulence of the infecting tubercle bacillus; (2) the mass of the infecting dose; (3) the frequency of repetition of the dose; (4) the failure of the tissues to establish immunity. Upon this hypothesis it may be assumed that (a) Infants infected with large doses of tubercle bacilli die without manifesting organic signs of tuberculosis. (b) Infants infected with small doses of bacilli at infrequent intervals acquire a resistance to the clinical development of the disease. (c) If this resistance holds, a reinfection is not likely to occur in adult life. (d) Of the adults who exhibit organic signs of tuberculosis, many are patients who have been infected in childhood, but whose resistance has failed, or whose tubercles have broken down, causing a re-infection. There remains, however, a small percentage who have never been exposed to infection, have no immunity, and who succumb to a neo-infection.

ORIGINAL ARTICLES.

KOCH'S DISCOVERY OF THE TUBERCLE BACILLUS.

By S. LYLE CUMMINS,

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WHEN Robert Koch, in 1882, faced the problem of the etiology of tuberculosis he was in a position similar to that of a bacteriologist of today who envisages the problem of an infective disease caused by an invisible germ.¹

There existed already, through the preliminary observations of Klenke (1843) and the conclusive inoculation experiments of Villemin (1864), absolute proof of the infectivity of tuberculosis; but not even the most competent microscopist had yet been able to produce any convincing evidence of a visible organism invariably associated with the disease. Koch came to the problem fresh from his success in working out the etiology of anthrax, a success which, for sheer genius in devising new methods and for sheer perfection and precision of technique, had eclipsed any previous work in microbiology.

It was characteristic of Koch that he began by formulating a comprehensive scheme of investigation which committed him to the most exacting tests, but which, if successfully carried out, would supply in advance a conclusive answer to every kind of criticism. His scheme of research was as follows:

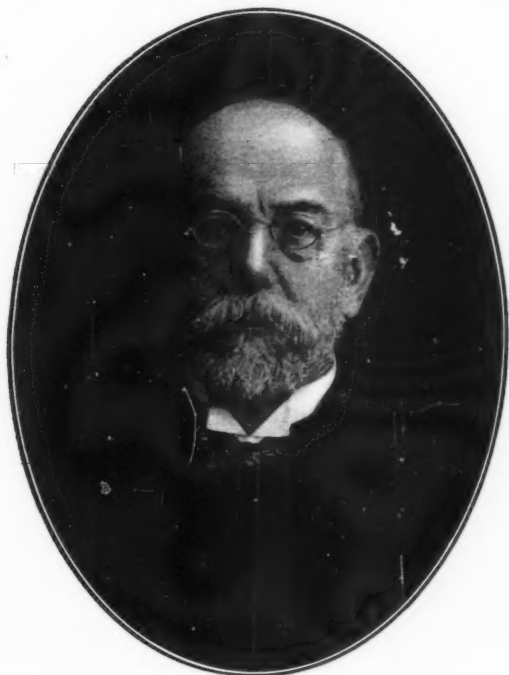
1. To determine whether formed elements which could neither belong to the constituents of the body nor have sprung from them were present in the diseased parts.
2. If this was so, to ascertain whether they were organized and whether they possessed any sign of independent life.
3. Further, to ascertain the relation of them to their surroundings, the behaviour of the neighbouring tissue elements, their distribution throughout the body and their presence in different stages of the morbid process.
4. To demonstrate not merely their coincidence with the disease "but beyond this it must be shown that the parasites directly produce the disease."

¹ Koch, R., "Die Ätiologie der Tuberkulose" (Nach einem in der Physiologischen Gesellschaft zu Berlin am 24 März 1882, Gehaltenen Vortrage, *Berlin Klinische Wochenschrift*, 1882).

KOCH'S DISCOVERY OF TUBERCLE BACILLUS 73

How was this latter point to be settled? "To obtain this proof," he answers, "it will be necessary to isolate the parasites completely from the diseased organism and from all the products of the disease to which any pathogenic influence could be ascribed; then to excite anew the disease with all its special characteristics by the introduction of the parasites alone into a healthy organism."

Such was the scheme; what of the investigation that followed?



ROBERT KOCH.

THE DISCOVERER OF THE TUBERCLE BACILLUS.*

Let us picture for ourselves what we should do in like case, faced with a cadaver dead of tuberculosis, but completely unprovided with any of the facilities which render so easy for us the demonstration of Koch's bacillus today: no collection of little bottles of strong carbol fuchsin, of 25 per cent. nitric acid, of alcohol, of methylene blue, and so on.

* We are indebted to the kindness of Professor Otto, of the Institut Robert Koch, 12, Foehrer Strasse, Berlin, for the photograph of Robert Koch from which the accompanying portrait has been prepared. This was taken by Carl Günteritz, of Berlin, through whose courtesy we are permitted to reproduce it here.

Nothing but the diseased tissues on the one hand and a microscope and slides on the other. Koch started by selecting "material in which the infective virus might confidently be expected to exist"—sections of grey tubercles, crushed and teased-out tubercles, and so on. Portion after portion was submitted to examination, and we may guess the hours of thorough work which were consecrated to the search; but "every effort to discover bacteria or other micro-organisms in these preparations was unsuccessful." Either there were no visible micro-organisms present or the germs were escaping detection through some chemical or physical character which made it difficult to render them visible.

Possibly some special staining method, used in some specially penetrating way, might bring the parasites to light. Previous work with the anthrax bacillus and other organisms had taught Koch that the best differentiation of bacteria from surrounding tissues was to be obtained with stains with an alkaline reaction, and that, amongst the common aniline dyes, methylene blue bears the freest addition of alkalis. He therefore decided to try methylene blue. "To a watery solution of it, caustic potash was added so long as no precipitate formed and the fluid remained clear." Cover-glass preparations, exposed to this stain for twenty-four hours, were then examined, and there, to the trained eye of Robert Koch, were visible "very fine rod-like forms in the tubercular mass." But these were very difficult to recognize in sections, where so many nuclei and strands of cellular material might take up the blue stain and cause confusion. He turned for help to the contrast-staining methods of Weigert and selected a concentrated solution of vesuvin as likely to bring about the desired differentiation. Treating with this new solution the cover-slips and sections already stained as above described with methylene blue, he obtained the contrast for which he had been seeking. "The previously blue-stained cell nuclei and detritus had become brown, while the tubercle bacilli (as we now know them to be) remained a beautiful blue."

Other staining methods followed, notably that of Ehrlich, and finally the easy and convenient technique of Ziehl; but, as the writer knows from his own observations, there is no more beautiful or striking contrast than may be obtained by this first tentative method devised by Koch himself. *But were these organisms tubercle bacilli?* An endless series of examinations showed that, if skilfully and patiently sought for, they were always present in "tubercular" tissues, though not to be found in tissues and secretions free from tuberculous involvement. They must first be isolated in pure culture before any conclusive tests could be initiated. "From the beginning, the method of cultivation upon a solid transparent soil was employed because it surpasses all other methods in certainty and ease of manipulation."

KOCH'S DISCOVERY OF TUBERCLE BACILLUS 75

Koch first tried to grow the bacilli from tissues on a "nutrient jelly of meat infusion with peptone solidified by gelatine," but without success, as the gelatine liquefied at 37° C. To avoid this difficulty he then turned, for a solid and transparent medium, to solidified blood serum, which could be rendered sterile by means of Tyndell's method of "repeated heating" which had proved effective in work with hay infusions. Koch found that blood serum became solid and yet remained transparent at 65° C., and that it could remain at 37° C. for long periods without change. The cultivation of tuberculous material spread on this substrate led to the growth of little colonies of bacilli, with the staining characters already described, after some ten to fifteen days. These cultures, obtained either directly from cases or after inoculation of guinea-pigs with tuberculous material and culture from their organs, were kept going for generation after generation until all possibility of a "carry over" of infective material, other than the germ, from the original tissues could be completely eliminated.

Then followed those patient experiments in the production of tuberculosis in healthy animals by means of his cultures, which must be studied at first hand in the works of Robert Koch. The end had been attained; the victory had been won. Not only was tuberculosis an infective disease, but the infective organism was here, before one's eyes, in that rough, dry, contorted and faintly pigmented colony on inspissated blood serum.

Much more was to follow through the vision of that same master mind: the discovery of tuberculin; the appreciation of Koch's phenomenon, the allergic state as it has since been christened by Von Pirquet; the production of immunity in experimental animals through the induction of a mild infection; the differentiation between "human" and "bovine" tubercle bacilli along the trail first "blazed" by Theobald Smith; the growth-inhibiting properties of certain gold salts.

How little we know today that Koch did not find out for us! But all these wonders were but the outcome of Koch's greatest gift to medical science, the discovery of the tubercle bacillus.

Surely the world does right to celebrate the jubilee of Koch's epoch-making discovery of the cause of one of the greatest scourges of mankind.

THE TEACHING OF TUBERCULOSIS.

By JAMES CROCKET,

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ONE hears continually in medical circles of an overcrowded medical curriculum. To discuss, therefore, an additional course seems, to say the least, a matter that is unreasonable. The present article is not a plea that a class in tuberculosis be added to the curriculum of every medical student in this country, but a statement regarding the writer's work and experience as a teacher of tuberculosis for the past thirteen years. He was appointed by the University of Glasgow as a lecturer on "Clinical and Practical Tuberculosis" in 1919. Sir Robert Philip had not long previously been appointed Professor of Tuberculosis in the University of Edinburgh. Professor Lyle Cummins, I think, began his work in Wales later. Since 1919 a course of teaching on tuberculosis has been given each term to Glasgow medical students in their fourth or their fifth year, three courses in each year. For the first eight years the classes were voluntary, but since 1927 they have been compulsory. All medical students in Glasgow as well as in Edinburgh University must now take a course of lectures on tuberculosis before entering for their final examination. There are at the present time two official lecturers on tuberculosis in Glasgow.

There were difficulties at the beginning in arranging hours and in regard to the place of meeting. These were, however, not considered very seriously, partly because it was hoped that they would keep away any who were not very keen on the work. These difficulties have remained. For example, on the one hand, the dispensary where teaching in clinical methods can be given is somewhat remote from the University and the teaching hospitals; the sanatorium where the main clinical work can be carried on is fifteen miles from the city and involves a half-hour's train journey and a two miles' walk along a country road, and motor-buses are not available. On the other hand, the chief period of teaching could only be arranged for the Saturday afternoon, and from 2 p.m. till 5.15 p.m. This time was frequently extended to 7.15 p.m., involving the students being away from the city from 1 p.m. till 6 p.m., and sometimes till 8.30 p.m. The other periods were on two afternoons during the week when no other classes were

being held. So far from these difficulties deterring the students from taking the course and attending regularly, both during the voluntary period and the compulsory period, the classes have, as a rule, been excessively large and therefore frequently somewhat difficult to handle. It is not uncommon for a student to take the course twice. During the post-war period, when great numbers of students passed through the University, as many as eighty voluntarily attended at a single course. During recent years thirty to fifty have been common figures. One can but conclude that, with the curriculum crowded or not crowded, the students themselves feel that tuberculosis is one subject that should be included in their curriculum. Tuberculosis is a subject that meets the student in practically every department of study—medicine, surgery, dermatology, otology and laryngology, ophthalmology, gynæcology, and psychiatry. To have a comprehensive knowledge of tuberculosis, therefore, is to have in a sense a grasp of a very large and important section of medicine and surgery. It undoubtedly is advantageous in every way to study the subject as a whole.

It may interest those who have to do with teaching students to see the curriculum adopted by the writer at the beginning of the course, which has been followed ever since with relatively but few modifications. The class meets regularly, as already stated, on three days a week—on Tuesdays for one hour in the Practice of Medicine classroom of the University; on Thursdays for approximately an hour and a half in the Dispensary of the Sanatorium at the east end of the city; and on Saturday afternoon for fully three hours at the Consumption Sanatoria of Scotland, at Bridge of Weir. In addition to these periods, in order that students may have more experience in examining cases—lung and laryngeal tuberculosis particularly—they are invited to come down to the Sanatorium in small groups on Wednesday afternoons and evenings, or to remain behind for a couple of hours after the main body of the class has left on Saturday evening. As a rule groups of four to eight or more attend voluntarily at these periods, and have then a special opportunity of getting valuable clinical experience.

On Tuesdays, at the University, a course of eight or nine lectures is given, embracing as far as possible the subject generally. The lectures are as follows: (1) Historical Facts regarding Tuberculosis and the Epidemiology of the Disease; (2) The Causation of Tuberculosis; (3) The Channels of Entry of the Tubercle Bacillus; (4) The Development of Tuberculosis and the Varieties of the Disease; (5) The Basis of Symptoms in Pulmonary Tuberculosis; (6) The Main Symptoms of Phthisis Pulmonalis and their Significance; (7) Tuberculin in Diagnosis and Treatment; (8) Tuberculosis in Childhood; (9) General Treatment of Tuberculosis.

On Thursdays, at the Dispensary, cases are examined with the

students, and a series of lecture-demonstrations is given on methods of physical examination in the diagnosis of pulmonary tuberculosis. These lectures, in extended form, have been published by Messrs. Lewis and Co., and are obtainable in book form by the students. The course is as follows: (1) Methods of Physical Diagnosis Generally; (2) X-Rays in the Diagnosis of Lung Diseases; (3) Surface Anatomy of the Thorax relative to Physical Examination of the Chest; (4) Inspection in Tuberculosis of the Lungs; (5) Palpation of the Chest in Diagnosis; (6) Percussion of the Chest; (7) Auscultation—Breath Sounds met with in Phthisis; (8) Auscultation—Adventitious Sounds in Phthisis.

On Saturdays, at the Sanatorium, the students are given a series of lecture-demonstrations from 2 p.m. till 3.30 p.m. After a little refreshment clinical work is carried out from 4 p.m. till 5.15 p.m. The order of work is as follows: (1) Classification of Pulmonary Tuberculosis: Demonstration of Illustrative Cases of the Disease in Various Stages; (2) The Tubercle Bacillus: Bacteriological Features: Methods of Investigation: Examination of Sputa; (3) Complications Resulting from Extension of the Disease: Pleurisy, Bronchiectasis, Pneumothorax; (4) Complications Resulting from the Conveyance of the Sputum from the Diseased Area: Laryngitis, Gastro-Intestinal Tuberculosis, Ischio-Rectal Abscess, Lupus; (5) Complications Resulting from the Conveyance of the Organism by the Blood Stream: Genito-Urinary Tuberculosis, Bone and Joint Tuberculosis, Meningitis, Addison's Disease; (6) Complications Resulting from the Conveyance of the Organism by the Lymph Stream: Adenitis, Tuberculous Abscesses: Complications Due to the Effects of the Toxins: Fatty Degeneration, Amyloid Disease, Muscular Dystrophy; (7) Special Tests Useful in the Diagnosis and Prognosis of Tuberculosis: The Opsonic Index, The Blood Sedimentation Test, The Arneth Blood Count, Complement Fixation, Urine Tests, etc.

On the last Saturday of the course a three-hour examination is held: during the first half, a paper is set; during the second half, patients have to be examined and reported on.

It will be noted that in the course little is said about administrative control of tuberculosis. It is certainly not made the subject of any special lectures, although it is usually referred to. The course is essentially a clinical and practical one, and is not particularly for those who intend to be officials in the tuberculosis service. Any who determine to go further in the subject or to take up tuberculosis as their life-work have abundant opportunities of acquiring administrative knowledge in other ways later. The need for extra clinical experience in chest diseases in these days is much greater than it was at one time, as tuberculous cases are excluded from the general hospitals and

infirmaries. This makes it difficult for the modern student to see and follow the progress of the disease which in its various forms still claims one-third of all who die between fifteen and thirty-five years of age.

This article is not written as a plea that tuberculosis should be made a compulsory subject in the medical curriculum of every university, but it really amounts to such a plea. The course of tuberculosis has demonstrated over a fairly long period of years in one of our large British universities that such a class as has been described genuinely fills a gap, and meets a real need in the work of preparing for a medical career.

CRITICAL SURVEY.

MARITAL TUBERCULOSIS.

By MAURICE DAVIDSON,

M.D., F.R.C.P.,

Physician to the Brompton Hospital for Consumption and Diseases of the Chest.

THE question of marriage, in the case of a consumptive of either sex, is one upon which the advice of the specialist is not infrequently sought. In view of the prevalence of tuberculosis in all civilized communities, it behoves the physician seriously to consider the significance of this disease in relation to matrimony, and to ask himself what light the modern theory of phthisiogenesis has thrown upon this important aspect of the subject.

For a long time the majority of observers have recognized that the occurrence of manifest pulmonary tuberculosis in both husband and wife, despite the intimate contact of the average normal married life, is undoubtedly rare. This fact seems to have been recognized even when the doctrine of direct exogenous infection was much more in favour than it is at the present time. A good general account of the subject is given in Fishberg's well-known standard work on "Pulmonary Tuberculosis,"¹ in which the most striking statistical evidence is quoted for the infrequency of tuberculosis occurring in married couples or in the married contacts of individuals who have died from the disease. He quotes Mongour,³ who found among 440 married couples, in which one of the partners suffered from tuberculosis, only 4 per cent. of instances in which the consort was also tuberculous. Thom⁴ found only 3 per cent. in 402 couples. Levy² found 2.8 per cent. in 317 married couples living in poverty and sharing the same bed. Fishberg himself testifies, from an experience of thousands of cases, to the rarity of the instances in which tuberculosis was found in both husband and wife.

In this country, Theodore Williams in 1882 published figures relating to the infrequency of tuberculous infection among adults in daily contact, and this, together with other similar testimony, has been referred to in more than one commentary on the subject of conjugal tuberculosis as supporting the generally accepted view as to its rarity.

On the other hand, it is only reasonable to quote some of the

evidence which has been brought forward for opinions in an opposite direction. Ward,⁶ in an interesting communication, gives some striking figures compiled during the course of his work as a county tuberculosis officer, which led him to the conclusion that the modern authoritative view is erroneous and that direct infection is the important factor in the spread of tuberculosis. As a corollary to this he expresses the opinion that infection between man and wife is more frequent, since exposure to it is greater and more prolonged. His statistics are impressive; the tables of figures given in his paper merit serious attention, and are so important that we reproduce them here.

TABLE I.

RESULTS OF AN EXAMINATION OF HUSBANDS AND WIVES OF
TUBERCULOUS PATIENTS. (AFTER WARD, *loc. cit.*)

Figures collected over a Period of Five Years.

	Number Examined.	Tuberculous.	Suspect.	Negative.	Percentages.		
					Tub.	Sus.	Neg.
WIVES (Husbands first notified) ...	120	66	12	42	55	10	35
HUSBANDS (Wives first notified) ...	36	25	4	7	69	11	20
Total ...	156	91	16	49	58	10	32

TABLE II.

RESULTS OF AN EXAMINATION OF CONTACTS OF TUBERCULOUS
PATIENTS OTHER THAN HUSBANDS AND WIVES. (AFTER
WARD, *loc. cit.*)

Number Examined.	Tubercu- lous.	Suspect.	Negative.	Percentages.		
				Tub.	Sus.	Neg.
1,067	219	284	564	20	27	53

A similar conclusion is expressed in a carefully written paper by Verco,⁵ who gathered material for fifteen years on the subject of

phthisis in married couples. He investigated 518 cases of married men and women who had died of phthisis. Information was obtained as to whether their partners were still alive, and, in case of death, as to the date and cause of death. He found that in regard to 254 husbands who died of phthisis, 54 of the widows had died, 22 of phthisis, 32 of other diseases. Phthisis thus accounted for 40·75 per cent. of deaths recorded among the wives of phthisical men. In regard to 264 wives who died of phthisis, 77 widowers left by them had died, 9 of phthisis, 68 of other diseases. Among the widowers of phthisical women, therefore, phthisis accounted for only 11·7 per cent. of deaths. Verco concludes that in respect of conjugal infection women appear to be three or four times as liable as men.

It is interesting to note the above figures, as well as those of Ward, in view of some of the older observations on the subject. A most striking example of the latter is the well-known communication by the late Sir Herman Weber,⁷ who had the histories of 68 persons, male and female, with a tuberculous taint, who married healthy partners. Of the 68 individuals, 39 were husbands, 29 were wives. Only one of the husbands contracted tuberculous disease, while the wives of 9 out of the 39 husbands became affected. Altogether these nine husbands lost 18 wives: one lost 4, one lost 3, four lost 2 each, three lost 1 each.

Finally, by way of contrast, we may cite the case of Metchnikoff as an example of a husband who remained healthy, despite the fact that for some years he looked after his tuberculous wife, taking no precautions against contagion. His own account of the circumstance is given by Fishberg (*loc. cit.*, p. 550).

The general view adopted by most modern observers is, I am convinced, the correct one. It is that since all individuals in civilized communities are infected with the tubercle bacillus and rendered allergic in the first few years of life, immunity is thus obtained which is sufficient to protect most of them for life from ordinary exposure. Married persons are no exception to this rule, but if one of the partners has advanced disease, with a heavily infected sputum, the risk of massive doses of T.B. and consequent exogenous reinfection in the consort would appear, *prima facie*, to be somewhat greater.

This, then, is a fact which, in my opinion, it is the duty of a physician to point out to those of his patients who may seek his advice upon the matter. Provided that the usual common-sense precautions are observed, there does not appear to be more risk to the consorts of phthisical husbands or wives than to anyone else in frequent contact with tuberculous patients. The danger to the potential offspring is another question which, though it lies, strictly speaking, outside the scope of these remarks, must be mentioned on account of its obvious importance. No less urgent is the danger of parturition to the actively

tuberculous woman, and this, though again it does not exactly come under the problem of marital tuberculosis as properly understood, is one of the most salient items in the general counsel which the physician is called upon to supply to many of his patients who are about to marry.

1. FISHBERG, M. "Pulmonary Tuberculosis," Second Edition. Philadelphia and New York, 1919.
2. LEVY, L. (quoted by Fishberg). *Beitr. z. Klin. d. Tuberk.*, 1914, xxxii. 147.
3. MONGOUR (quoted by Fishberg). *Cong. Intern. de la Tuberculose*, Paris, 1905, i. 413.
4. THOM, W. (quoted by Fishberg). *Zeitschr. f. Tuberk.*, 1905, vii. 12.
5. VERCO, J. C. *Australas. Med. Gaz.* Sydney, 1911, xxx. 655.
6. WARD, E. *Lancet*, 1919, ii. 606.
7. WEBER, H. *Trans. Clin. Soc. Lond.*, 1874, vii. 144

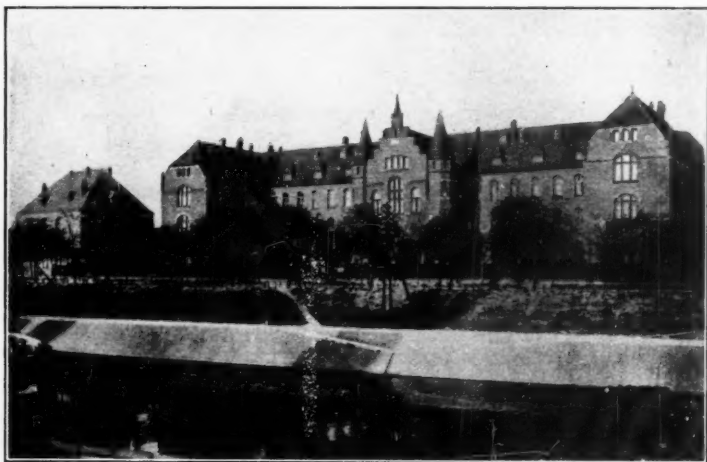
ASSOCIATIONS AND INSTITUTIONS.

TUBERCULOSIS RESEARCH AT THE ROBERT KOCH INSTITUTE.¹

By BRUNO LANGE,

Professor at the Robert Koch Institute.

SINCE the death of Robert Koch in 1910, this institute, which bears his name, has extended its investigations regarding tuberculosis in many directions and far beyond the bounds of knowledge obtaining in Koch's time. A series of investigations was embarked upon by the author and his collaborators about ten years ago. These enquiries dealt in the



THE ROBERT KOCH INSTITUTE.

first place with the modes of transmission of tuberculosis, particularly the conditions giving rise to intestinal tuberculous affections and the conveyance of the tubercle bacillus by dust and droplets. The most important conclusion to be derived from these researches is that infection by dust should be regarded as the most frequent and the most dangerous

¹ We are indebted to Dr. R. Otto, Professor at the Robert Koch Institute, 2 Foehererstrasse, Berlin, for kindly arranging with Professor Bruno Lange for the preparation of the present article and for favouring us with a copy of the photograph of the institute taken by Carl Günteritz, of Berlin, and forming one of the illustrations included in a volume entitled "Forschungsinstitute," published by Messrs. Paul Hartung, of Hamburg. Mr. C. A. Dunbar Mitchell, M.A. (Oxon.), A.I.C., of the Royal Institute of Public Health, London, has been good enough to prepare the English translation.—EDITOR B.J.T.

form of transmission of tuberculosis, while intestinal or droplet infections are of minor importance.

Further investigations were made as to the artificial production of sensitization and immunity by means of dead tubercle bacilli and on the specificity of the tuberculin reaction. In this connection voluminous experiments in recent years have been carried out on the immunization of different kinds of animals with B.C.G. As a result of all these investigations there is no prospect of arriving at any measure of practical immunization, except by the Calmette method; but even from this method we ought at present to expect only moderate results. As for the comparison of Calmette's inoculation with a virulent infection, the situation is this: we can say that the degree of immunity is proportional to the pathogenicity of the bacillus and to the degree and length of the tuberculous disease.

Latent tuberculous disease, as in the healing or waning of definite lesions, corresponding somewhat to latent infection in man, gives rise to quite a relatively small degree of protection, which grows weaker as the process of healing advances. Our findings, being at variance with the teaching of Behring and Römer on the immunizing effect of infection during childhood, have led us to undertake a systematic investigation into the factors which determine in general the genesis and progress of tuberculosis. Our later investigations show that differences in the infection dose play no appreciable part in either stage. Specific immunity acquired by infection can, as far as the genesis of the disease is concerned, in no way bear the interpretation which is almost universally attributed to it at the present time. On the contrary, it is clear from the animal experiments which have been carried out that not only the genesis of the disease, but also the manner in which it progresses, is supremely dependent on individual and innate powers of resistance—in fact, on constitutional and psychosomatic factors in the living human unit.

In recent years the question of the type of the tubercle bacilli—especially the problem of the importance of the bovine type for human tuberculosis—has been thoroughly worked out. Recently, for the first time in Germany, several cases of pulmonary tuberculosis have been recognized as being definitely traceable to an animal-borne infection; up to the present their number amounts to eight. From these and other considerations it appears that the bovine type of the tubercle bacilli is not so harmless for the human body as Koch had taken for granted in his time.

To conclude this brief survey one may say that recent tuberculosis researches at the Robert Koch Institute have been linked up with the great discoveries of Koch, especially in respect of etiological factors, types, tuberculin, and immunity; and in many respects they have filled the gaps which he had left open. Unfortunately, the elaboration and continuance of our researches at the present time are held up from lack of financial resources, and our work has to be restricted to barest essentials.

NOTICES OF BOOKS.

PULMONARY TUBERCULOSIS.

DR. P. ELLMANN has written a work which has long been needed.¹ It belongs to the well-planned "General Practice Series" issued by Messrs. H. K. Lewis and Co., and is intended primarily for medical practitioners and senior students. The manual is mainly an exposition of pulmonary tuberculosis, but it is so clear, revealing, and serviceable, and at the same time is so pleasingly presented, that medical superintendents of sanatoria, tuberculosis officers, and all other experts called to advise in regard to chest cases will find much in these pages which will be suggestive and helpful. The work is that of a young, experienced, forward-looking physician who faces the problems of tuberculous chest disease with vision and a sound understanding of the most modern views on the subject. As a reliable guide to the differential diagnosis of intra-thoracic tuberculosis and other chest troubles the volume is to be warmly commended. Not only does it direct the practitioner and student along trustworthy lines of clinical investigation, but it also affords an admirable general introduction to modern conceptions regarding pulmonary tuberculosis and the various recent advances which have been made in our understanding of chest affections through the application of scientific methods of diagnosis and the carrying out of sensible measures for effective treatment. The volume is divided into fifteen chapters, and in addition to those dealing with diagnosis, prophylaxis, prognosis, and treatment there are special chapters on Industrial Diseases of the Lungs, Pleural Effusion, Collapse Therapy, Drug, Dietetic, and Light Treatment, Symptomatic Treatment, and Complications of Pulmonary Tuberculosis and their Treatment. The book is strikingly illustrated by an exceptionally fine series of wisely selected illustrations. We would specially direct attention to the instructive skiagrams and their explanatory diagrams. Professor Cummins' Foreword deserves comment, for in it he has courageously exposed the inadequacy of existing methods whereby medical advisers are supposed to be trained for dealing with tuberculous cases. As Professor Cummins justly testifies, "the instruction of medical students, and it may be added of practitioners, is quite inadequate in relation to tuberculosis. The modern system under which consumptive cases are treated in special hospitals attached to medical schools deprives our teachers and students of valuable clinical material, and this loss to medical education will remain irreparable until the value of the hospitals and sanatoria of our local authorities is more generally recognized and more generally exploited by teachers of medicine."

¹ "Chest Disease in General Practice with Special Reference to Pulmonary Tuberculosis." By Philip Ellmann, M.D., M.R.C.P., Physician in Charge of the Tuberculosis and Chest Clinic, County Borough of East Ham, and Physician to the London Clinic, Pimlico. With a Foreword by Professor S. Lyle Cummins, C.B., C.M.G., M.D., David Davies Professor of Tuberculosis, Welsh National School of Medicine. Pp. xvi+266, with 132 figs. London: H. K. Lewis and Co. 1932. Price 15s.

Dr. Ellman has rendered a notable service by the preparation of his informing, suggestive, up-to-date handbook, and it is to be hoped that all general practitioners and senior students will be wise enough to study it. It is of interest to note that the volume is dedicated to Dr. Marcus Paterson.

T. N. KELYNACK, M.D., M.R.C.P.

THE SURGERY OF PULMONARY TUBERCULOSIS.¹

Professors Charrier and Loubat have prepared a volume devoted to the various methods of surgical collapse of the lung for pulmonary tuberculosis and, apart from a short chapter devoted to the treatment of the pleural complications, it is divided into three main divisions, dealing respectively with phrenicectomy, pneumolysis, and thoracoplasty. Phrenicectomy is discussed from the historical, anatomical, and anatomo-clinical aspects. The comparative innocuousness of bilateral phrenicectomy is illustrated by re-examination of a child operated upon three years previously. Although both diaphragms were high and immobile, the child ran and performed gymnastics with no more disability than other children. Phrenicectomy is advised in the comparatively early cases as an addition to pneumothorax where the latter is possible; in chronic cases for basal unilateral lesions; occasionally for apical lesions, when more logical treatment is ineffective or impossible; more rarely in bilateral pulmonary lesions, where persistent cough is followed by vomiting; hæmoptysis; the pulmonary lesions of children, where pneumothorax is impossible; and, lastly, in combination with thoracoplasty. Pneumolysis is divided into the intrapleural and extrapleural, the former being subdivided into open and closed methods. The views expressed against open division of adhesions agree with those generally held—that the operation is rarely satisfactory. Jacobæus' method is favoured, but the large number of secondary effusions is emphasized, varying from 16 per cent. to 50 per cent. with different operators. The end results, however, show that 65 per cent. are able to work, one to six years later. Extrapleural pneumolysis is fully discussed with some emphasis on the predominant French view that the anterior approach is the best. The results obtained and given suggest that 42 per cent. out of ninety-five patients were cured or on the way to cure. A considerable portion of the volume is devoted to thoracoplasty, and this is very clearly stated, but appears to be largely the experience of numerous operators rather than the particular experience of the authors. Certain methods, as thoracoplasty by the axillary approach alone, would not appear to justify such full description and illustration. The volume is completed by a bibliographical index of thirty-three pages, showing the enormous literature which is accumulating around this important subject. The book is clearly printed, and both the drawings and skiagrams are well reproduced. On the whole, it can be recommended as sound teaching of the present position of surgery in the treatment of pulmonary tuberculosis.

A. TUDOR EDWARDS, F.R.C.S.

¹ "Traitement Chirurgical de la Tuberculose Pulmonaire: Technique, Indications et Resultats." By A. Charrier et E. Loubat, Professeurs agrégés à la Faculté de Médecine de Bordeaux. Pp. 363 and 168 figs. Paris: Masson et Cie, Editeurs, 120, Boulevard Saint-Germain. 1932. Price 65 frs.

SANOCRYSIN-THERAPY.

Dr. Knud Secher's little book contains much useful information about the value and limitations of sanocrysin in the treatment of tuberculosis.¹ After a brief description of experimental work the author deals with the various complications which may arise during treatment. There are tables of dosage, and the different methods of administering the drug are discussed. Sanocrysin has now a definite place in the treatment of tuberculosis largely because too much is not and never has been claimed for it. Recent work by Dr. E. E. Atkin at the Brompton Hospital for Consumption shows that it will cure tuberculous lesions produced in rabbits by dead bacilli, so proving that it does not act upon the tubercle bacilli themselves but actually upon the lesion. If sanocrysin became advertised as a cure for consumption its dangers and the many cases in which it has failed would soon lead to the disuse of the drug. Dr. Secher's book does not exaggerate the value of sanocrysin, but discusses briefly and clearly the type of case which is most suitable for its employment, and the doses recommended for the various conditions and stages of tuberculosis. This monograph forms a valuable addition to the rapidly growing literature on the subject of sanocrysin-therapy. L. S. T. BURRELL, M.D., F.R.C.P.

SPONTANEOUS PNEUMOTHORAX.

Dr. Hans Kjærgaard has made a close study of the literature dealing with spontaneous pneumothorax in an apparently healthy individual.² He has himself collected from different Danish physicians and institutions records regarding fifty-one patients with a total of sixty-one attacks of pneumothorax (since some of them had more than one attack), and these cases he describes in full at the end of the book. There are two definite conclusions to be drawn from this work. In the first place, that the prognosis is remarkably good; not one of the fifty-one cases died of pneumothorax. Secondly, tuberculosis is not a common cause, for evidence of it was lacking in practically all the cases, nor did any tuberculous lesion subsequently develop. The cause of the pneumothorax in the majority of these cases appears to be the rupture of an emphysematous vesicle which has a valvular opening with a bronchiole, so that air cannot leave, but can enter and distend it. These valvular vesicles are not common in the general emphysema associated with chronic bronchitis, and pneumothorax is uncommon in such a case. Valvular vesicles may be present in a lung which appears otherwise healthy, or they may be associated with scar tissue. The author is to be congratulated on having collected so many cases and having collated cases described in single articles in various journals, and this book will form a valuable addition to the literature on the subject. L. S. T. BURRELL, M.D., F.R.C.P.

¹ "Traitement de la Tuberculose par la Sanocrysin." By Knud Secher, Médecin-Chef à l'Hôpital de Bispebjerg, Copenhagen. Pp. 110. Copenhagen: Levin and Munksgaard; Paris: J. B. Baillière et Fils. 1932.

² "Spontaneous Pneumothorax in the Apparently Healthy." By Hans Kjærgaard. Translated from the Danish by Hans Andersen, M.D., Copenhagen. Pp. 93, with 29 illustrations. Copenhagen: Levin and Munksgaard, Nørregade 6. 1932.

COLLAPSE-THERAPY.

Professor Nissen's monograph, with a short introduction by Sauerbruch, is an example of the valuable work carried out in the Surgical University Clinic of the Charité, Berlin.¹ It emphasizes the established position which thoracic surgery now holds in the treatment of certain cases of pulmonary tuberculosis, viz. by surgical collapse of the lung. It shows that, given the correct type of case, excellent results can be obtained in this way. Cauterization of adhesions in complicated cases of artificial pneumothorax and phrenic evulsion are outlined, but special attention is paid to local and general thoracoplastic operations. The monograph is well illustrated by some eighty excellent radiograms, under each of which a brief summary of the essential features and clinical result is to be found. The monograph should be useful to all who are interested in the treatment of pulmonary tuberculosis and the development of the surgery of the chest.

Dr. Léon-Kindberg's little book on collapse-therapy in pulmonary tuberculosis is an excellent handbook, and should be read by all interested in diseases of the chest.² The greater part of the book is devoted to artificial pneumothorax. There is an introductory chapter on the history of the subject. Its indications, contra-indications, technique, complications, duration of treatment, and results of treatment are all adequately treated. Bilateral pneumothorax, alternating and simultaneous, are discussed, and there is an interesting chapter on oleothorax. The limitations of pneumothorax treatment are indicated. The existence of adhesions is fully dealt with, and surgical collapse of the lung, phrenic evulsion, and local and general thoracoplastic operations, which are due mainly to unsuccessful pneumothorax, are fully described. Dr. Léon-Kindberg's well-balanced views on the subject of collapse-therapy in pulmonary tuberculosis will command general approval. He is prepared to admit its limitations despite his great enthusiasm. Above all, he recognizes that artificial pneumothorax must go hand in hand with sanatorium treatment. He emphasizes the fact that the former controls the pulmonary lesion, whilst the latter is specially related to the patient's general condition. The two are, in fact, complementary. The book contains a full bibliography on the whole subject of collapse-therapy.

PHILIP ELLMAN, M.D., M.R.C.P.

FRENCH AND GERMAN WORKS.

Dr. Finckoff in his recent monograph records some very remarkable results regarding cases in the wards of Professor Delbet, the subjects of tuberculosis of joints who had previously been dealt with surgically, and are now treated by injections of iodized oil together with calcium salts.³ The basis of the treatment depends on

¹ "Über die neuere Entwicklung der chirurgischen Behandlung der Lungen-tuberkulose." By Professor Dr. R. Nissen. Pp. 16, with 3 illustrations in text and 82 figs. Berlin: Urban and Schwarzenberg, 1932. Price Rm. 6.

² "La Collapsothérapie de la Tuberculose Pulmonaire." By Michel Léon-Kindberg. 2^{me} édition. Paris: Masson et C^{ie}, 1931.

³ "Le Traitement des Tuberculoses Chirurgicales par l'Huile Iodée et les Sels de Calcium." By Dr. A. Finckoff. With Preface by Professor Pierre Delbet. Pp. 244. Paris: Nobert Maloine, 27, Rue de l'École-de-Médecine, 1932.

raising the leucocytic action of the blood, and so increasing the patient's resistance against the tuberculous disease by stimulating the defence mechanism of the blood. The subject is dealt with both from the theoretical and practical points of view, and the results of many cases are described and are well illustrated. Professor Pierre Delbet himself now employs the method of Dr. Finckoff as a routine in his wards for cases of joint tuberculosis, having been very sceptical of the method when Dr. Finckoff first introduced it. The volume is throughout well illustrated with skiagrams, and the subject is presented in a convincing manner and is worthy of the special attention of all interested in joint tuberculosis.

Dr. Mayrhofer has written a small volume summarizing very aptly the whole subject of pneumothorax treatment in pulmonary tuberculosis.¹ It is a useful and practical treatise dealing with the indications, contraindications, technique, duration of treatment, and complications in pneumothorax therapy. The value of phrenic evulsion as a form of treatment is fully discussed and compared with that of pneumothorax. There are a number of explanatory diagrams illustrating points outlined, and the volume should be useful to the physician who desires a small work dealing with the practical aspects of the subject.

Dr. Winkler considers percussion an art which is being sadly neglected in days when instruments are tending to replace clinical methods.² No one will quarrel with Dr. Winkler when he emphasizes the fact that clinical methods stand supreme, but percussion alone is one of several factors in the diagnosis of pulmonary tuberculosis. It is surely upon the cumulative evidence of all findings, clinical (inspection, palpation, percussion, and auscultation), radiological, and bacteriological, that diagnosis must rest. One cannot help but feel in perusing the pages of this book that, granted the importance of the subject, too much emphasis is being placed on one single method—the intricacies of the art, of which are, at best, only mastered by the few—at the expense of other methods equally important and equally helpful. Every form of percussion that has been in use is fully described and well illustrated, and there is a comprehensive bibliography.

PHILIP ELLMAN, M.D., M.R.C.P.

MANUALS FOR MEDICAL ADVISERS AND WORKS OF REFERENCE.

Messrs. John Wright and Sons, Ltd., have rendered members of the medical profession a notable service by the issue of their fine volumes of the Index Series in Medicine and Surgery. (The complete set of four volumes, dealing with Differential Diagnosis, Symptomatology, Treatment, and Prognosis, is issued at an inclusive cost of £8 8s.) These reference works should have a foremost place in every practitioner's library. A new and fourth edition of the volume devoted to "Prognosis and End-Results of Treatment" has just been issued

¹ "Indikation und Technik des künstlichen Pneumothorax." By Dr. Heinrich Mayrhofer. Pp. 35, with 33 figs. Vienna: J. Springer, 1, Scholtengasse. 1932. Price Rm. 2.40.

² "Die Perkussion der Lungenspitzen: ein Grundriss für Ärzte und Studierende." Von Dr. Alfons Winkler, Privatdozenten an der Universität, Graz, Primararzt der Heilstätte Enzerbach in Steiermark. Ss. 135, mit 66 Abbildungen im Text. Wien: Verlag Emil Haim and Co., Maria-Theresien Strasse. 1932. Price Rm. 6.

under the editorship of Mr. A. Rendle Short.¹ The first edition appeared in 1915, and it is nine years since the last edition was published. The editor has been assisted by twenty-eight well-known contributors, and all sections have been carefully revised and brought up to date. The work is ideal for ready reference, being arranged under alphabetically announced headings and having an excellent index. It furnishes in authoritative and effectively presented signed sections succinct accounts of the end-results of various methods of treatment, and furnishes data and opinions whereby, apart from considerations of treatment, the medical adviser can form an accurate forecast of the course of a disease in an individual patient. The sections dealing with tuberculous disease should be studied by all who have to advise regarding tuberculous cases. Mr George Perkins deals with the various forms of Tuberculous Arthritis, giving table and references; Mr. J. W. Thomson-Walker contributes the sections on Tuberculosis of the Kidney and Bladder; Mr. A. Rendle Short furnishes a useful summary concerning Tuberculous Epididymitis; Dr. A. J. M. Wright is responsible for the section on Laryngeal Tuberculosis; the editor deals with Tuberculous Lymphadenitis and Tuberculous Peritonitis; Dr. Cecil Wall provides a helpful account of Pulmonary Tuberculosis; and other tuberculous troubles are dealt with in short sections. Such an enumeration will indicate that this elaborate reference book will be specially serviceable to medical superintendents of sanatoria, tuberculosis officers, and others responsible for the care of tuberculous subjects.

In the valuable and greatly appreciated Synopsis Series of Handbooks published by Messrs. John Wright and Sons, Ltd., of Bristol, one of the most popular and serviceable is Dr. A. W. Bourne's admirable summary of essentials relating to Midwifery and Gynaecology.² A new and fifth edition of this work has recently been issued, and should be in the possession of every medical practitioner and senior student. It has been thoroughly revised and brought up to date, and new diagrams have been added. A detailed account appears of the Stockholm technique for treating carcinoma of the cervix. Dr. Bourne's cleverly constructed and most practical synopsis is intended to be used in conjunction with the standard textbooks, and it certainly provides unique means for rapid revision and effectively meets the needs of those working for examinations in midwifery and gynaecology.

Dr. John Henderson has just provided a new and ninth edition of the handbook of medicine issued under the names of Wheeler and Jack.³ This justly popular compact compendium, first published in 1894, has found much favour with students and practitioners. The work has undergone thorough revision and has been brought up to

¹ "An Index of Prognosis and End-Results of Treatment." By Various Writers. Edited by A. Rendle Short, M.D., B.S., B.Sc., F.R.C.S., Hon. Surgeon, Bristol Royal Infirmary. Fourth edition, fully revised. Pp. xi+599. Bristol: John Wright and Sons, Ltd., Stonebridge House, Colston Avenue, 1932. Price 42s.

² "Synopsis of Midwifery and Gynaecology." By Aleck W. Bourne, M.A., M.B., B.Ch., F.R.C.S., Senior Obstetric Surgeon, Queen Charlotte's Hospital, London, etc. Fifth edition. Pp. vii+439, with 175 figs. Bristol: John Wright and Sons, Ltd. 1932. Price 15s.

³ "Wheeler and Jack's Handbook of Medicine." Revised by John Henderson, M.D., F.R.F.P.S. (Glas.), Physician, Glasgow Royal Infirmary. Ninth edition. Pp. xix+654, with 30 figs. Edinburgh: E. and S. Livingstone, 16 and 17, Teviot Place. 1932. Price 12s. 6d.

date; old sections have been recast and new ones added, making it an admirable introduction to the study of medicine, and such as will still further be appreciated in all English-speaking countries. The sections devoted to an exposition of tuberculosis are lucid, succinct, and practical. Messrs. Livingstone have produced the book in the customary admirable form which we now expect from this enterprising firm of medical publishers.

Dr. Bruce Williamson has written a unique handbook on pediatrics.¹ It is condensed, comprehensive, up-to-date, forming an ideal introduction to the practical study and management of disorders and diseases occurring in infancy and childhood. This illuminating, suggestive, and novel little volume is one which should appeal to senior students and young practitioners, and we would particularly commend it to those preparing for university degrees and the membership of the colleges of physicians. The arrangement, presentation, and general format of the work is peculiarly satisfying, and at the head of each of the twenty-nine chapters is placed a concise, tabular synopsis. There are a number of judiciously selected illustrations. Excellent short descriptions are provided of the various tuberculous affections met with in early life. The book also contains a Formulary, which practitioners will find of service. The publishers are to be congratulated on the convenient form, pleasing appearance, and reasonable price of the volume.

Dr. Philip P. Jacobs has rendered a practical service by the preparation of his new work on the tuberculosis campaign in the United States.² It is divided into four parts, dealing respectively with Historical Aspects, Methods and Programs, Fundamental Policies, and Illustrative Programs. Much practical information is skilfully and serviceably presented in a form which all interested in tuberculosis services will appreciate. We commend Dr. Jacobs' work to the study of all tuberculosis workers in this country. The selected references will be helpful to serious students. It is worthy of note that the volume is dedicated to Livingston Farrand, Charles J. Hatfield, Linsly R. Williams, and Kendall Emerson, leaders in the fine service rendered for many years by the American National Tuberculosis Association.

"The Study of Bronchial Asthma," by Professor Vallery-Radot and Dr. François Claude, which appeared in *La Pratique Médicale Illustrée*, edited by Professor E. Sergent and Drs. R. Minot and and R. Turpin, can now be obtained as a separate number.³ It furnishes a succinct and serviceable survey of characteristics, pathology, clinical forms, associated syndromes, diagnostic tests, and therapeutic measures.

Dr. C. E. Sundell's brochure on rheumatism provides a general

¹ "A Handbook on Diseases of Children, including Dietetics and the Common Fevers." By Bruce Williamson, M.D., M.R.C.P., Physician to the Royal Northern Hospital, London, etc. Pp. xii+290, with frontispiece and 50 figs. Edinburgh: E. and S. Livingstone, 16 and 17, Teviot Place, 1931. Price 10s. 6d.

² "The Control of Tuberculosis in the United States." By Philip P. Jacobs, Ph.D. Pp. viii+407. New York: National Tuberculosis Association, 450, Seventh Avenue, 1931. Price \$2.00.

³ "L'Asthme Bronchique." By Pasteur Vallery-Radot, Professeur Agrégé à la Faculté de Médecine de Paris, and François Claude, Médecin-consultant au Mont-Dore. Pp. 54, with illustrations. Paris: Gaston Doin et Cie, 8, Place de L'Odéon, 1932. Price 16 frs.

survey of so-called rheumatic disorders in a form which will be of service to medical advisers and intelligent non-medicals interested in the problem of rheumatism as met with in industrial workers and other members of the community.¹ Causation, clinical tests, manifestations, preventive, palliative, and auxiliary methods of treatment are all lucidly and helpfully discussed, and notes of illustrative cases are given.

Drs. H. D. Chadwick and F. Maurice McPhedran have prepared a brochure in which they have sought to correlate our present knowledge regarding the etiology and evolution of tuberculosis in childhood.² The work is issued with the approval of the Committee on Childhood Tuberculosis of the American Sanatorium Association, of which Dr. Chadwick is Chairman. This work merits the unprejudiced study of all medical advisers having to deal with tuberculous children. There is an excellent account with coloured illustrations of the tuberculin test applied according to the Mantoux or intracutaneous method. There are also excellent reproductions of films of the chest with explanatory diagrams. We should like to see this brochure extended into an elaborate and detailed work.

Dr. M. Kaplan has written a brochure on Aurotherapy, with special reference to "Crisalbine," a gold sodium thiosulphate preparation which is being advocated as of service in the treatment of pulmonary tuberculosis.³

Dr. Mukerjee's manual on the diagnosis and treatment of tuberculosis has been compiled for the instruction of senior students and recently qualified practitioners in India.⁴ Much useful information and guidance is presented in a compact form with summaries of clinical features and methods in serviceable tables.

Mr. W. Ridley-Makepeace, a ramblor for over sixty years, and author of the much-appreciated booklet, "Goathland Walks" (now, we understand, out of print), has written a charming little work which will be welcomed by lovers of North Yorkshire's moorland and its picturesque coast-line.⁵ This part of England is ideal for the pedestrian, and offers many attractions for lovers of nature, artists, and health seekers. Mr. Ridley-Makepeace's brochure consists of a detailed account of eleven "walks," and contains much interesting information set forth with literary skill and a real appreciation of the requirements of those who are wise enough to desire exploration of the "pedestrian's paradise."

¹ "Rheumatism: A Study of its Nature and Cure." By Charles E. Sundell, M.D., M.R.C.P., Senior Physician to the Seamen's Hospital, Greenwich, etc. Pp. x+88. London: Southern Libraries, Ltd., Balfour House, Great Titchfield Street, W. 1. 1929. 4s. 6d.

² "Childhood Type of Tuberculosis: Diagnostic Aids." Pp. 29, with illustrations. New York City: National Tuberculosis Association, 370, Seventh Avenue. 1931. Price 25 cents

³ "Radiological Changes observed during Treatment of Pulmonary Tuberculosis by Aurotherapy." By Dr. M. Kaplan, Ancien Externe des Hôpitaux de Paris. Pp. 78, with bibliography and radiographs. London: May and Baker, Ltd., Battersea, S.W. 11. 1933.

⁴ "Tuberculosis and its Early Diagnosis and Treatment." By Jadugopal Mukerjee, M.B. Pp. vii+71. Calcutta: Sree Saraswaty Press, 1, Ramanath Mazumder Street. 1930.

⁵ "Walks and Talks on the North Yorkshire Coast and Moors." By W. Ridley-Makepeace, F.C.I.S., M.I. and S.Inst., F.R.E.S. Pp. xv+120, with map and illustrations. London: A. Brown and Sons, Ltd., 5, Farringdon Avenue, E.C. 4. 1931. Price 1s.

Miss A. S. Botkin has introduced a novelty in guides. The first of what is intended to be a series deals with Italian cities—Florence, Milan, Naples, Rome, and Venice.¹ The information is set forth in a series of cards 5 inches by 3 inches, each containing data likely to be of interest and service to the tourist, and all are enclosed in a pocket case.

Mr. C. F. Carr's guide to hiking and camping will appeal to all interested in furthering open-air life, and should be known to doctors, teachers, and all others who are working for the development of a vigorous and happy race.² As Sir Arbuthnot Lane indicates in his commendatory Introduction, "those who are helping to organize the open-air life on a truly national scale are rendering a service of the greatest importance to our people, and are surely helping to convert us from a C3 to an A1 nation." Mr. Carr's manual is an indispensable handbook for all who desire to join the great out-of-doors brotherhood: it provides information and guidance regarding all aspects of hiking and camping, and there are addresses of organizations at home and abroad.

Medical visitors to Vienna and other parts of Austria should secure the new edition of the Austrian Year Book, a copy of which has reached us from the Austrian Legation in London, 18, Belgrave Square, S.W. 1.³ Present-day Austria is still a land of rich and ancient culture, and Vienna has contributed immense service to world-wide medicine. The new Year Book contains up-to-date information regarding the national life and manifold activities of Austria, and there is much that will be of interest and assistance to British and American medicals visiting Vienna. We would suggest that in next year's issue a section should appear regarding hospitals and medical services in Vienna and sanatoria in Austria likely to be of special interest to English-speaking visitors.

The reports of the Surgeon-General of the U.S.A. Public Health Service are always documents of exceptional interest and much value to medical officers of health on both sides of the Atlantic. The latest volume merits serious study.⁴ It contains statistical and other data relating to many diseases and other matters dealing with the organization and administration of public health. As regards tuberculosis it is stated that for the calendar year 1930 a new minimum death-rate for tuberculosis has been established—68.5 per 100,000 of population. The record for tuberculosis of the respiratory system, which causes approximately 90 per cent. of deaths attributed to all forms of tuberculosis, shows a like favourable decline, the death-rate having dropped from 66.1 per 100,000 in 1929 to 61.4 in 1930. At the beginning of the present century the rate was 200 per 100,000.

¹ "The Card Guides. I.: The Italian Cities." Compiled by A. S. Botkin. London: Elkin Mathews and Marrot, Ltd., 54, Bloomsbury Street, W.C. 1. 1932. Price 3s. 6d.

² "The Complete Hiker and Camper." By C. F. Carr. With an Introduction by Sir W. Arbuthnot Lane, Bart., C.B., and with "Hints to Hikers," by T. W. Green. Cartoons by "Richardson" and other illustrations by Ronald Moody. Pp. x+141. London: Sir Isaac Pitman and Sons, Ltd., Parker Street, Kingsway, W.C. 2. 1931. Price 2s. 6d.

³ The Austrian Year Book, 1931. Edited by the Austrian Federal Press Department of the Federal Chancellory. Third edition, revised and enlarged. Pp. viii+274, with map. Vienna: Manzschke Verlags und Universitäts-Buchhandlung. 1931. Price 8 Austrian schillings.

⁴ "Annual Report of the Surgeon-General of the Public Health Service of the United States for the Fiscal Year, 1930." Pp. vii+358. Washington: Government Printing Office. 1930.

The United Fruit Company, the headquarters of which are at Boston, Massachusetts, has issued the Nineteenth Annual Report of the Medical Department. It is a handsome volume of 276 pages, with numerous illustrations, charts, map, and statistical tables, together with a number of original signed articles dealing with tropical and other diseases met with in the countries where the company carry on its work and renders valuable medical assistance. There is a section relating to tuberculosis.

Dr. Thomas Stephenson, editor of *The Prescriber*, has prepared a new edition of his compact and serviceable monograph on incompatibility in prescriptions.¹ All writers and dispensers of prescriptions should possess a copy. It is divided into two parts: (1) General principles of incompatibility, and (2) a dictionary of incompatibilities alphabetically arranged.

Under the *nom de plume* of "Homo Sum" has been issued a wise and humorous brochure on shaving, which, while appealing specially to Cambridge men, contains matter which merits the consideration of doctors and patients, especially those who under sanatorium conditions desire to maintain the hygienic life.

The Department of Scientific and Industrial Research, 16, Old Street, Westminster, S.W. 1, has issued the Seventeenth Report on "The Investigation of Atmospheric Pollution," giving observations in the year ended March 31, 1931 (price 5s. 6d.). In 110 pages are set forth valuable statistical and other data based on observations in various centres and the results of special researches.

A 1932 edition of Carter's "Blue Book of Gardening" is now available, and should be in the hands of all who cultivate flowers and are interested in vegetable gardens.² It is admirably produced and generously illustrated.

"The Rambler's Handbook" is to be commended to the attention of all planning health touring and hiking in this country.³ It contains much valuable information regarding hotels and houses for refreshment, rambling clubs and walking tours.

The various British railway companies are providing admirably illustrated and informing handbooks regarding holiday and health centres. The Great Western Railway has issued under the title of "Holiday Haunts" a monumental official guide, edited by Maxwell Fraser, F.R.G.S., dealing with resorts in Cornwall and Devon and other parts of the G.W.R. system. "The Holiday Handbook" of the L.N.E.R. is an exceptionally fine production, rich in fine pictures, some in colours, reproduced from photographs, and with excellent plans of a number of chief towns on the system. "Holidays by L.M.S." is also a notable production, strikingly illustrated, and full of practical information. (Each volume is published at 6d.)

¹ "Incompatibility in Prescriptions and How to Avoid It: to which is Added a Dictionary of Incompatibilities." By Thomas Stephenson, D.Sc., Ph.C., F.R.S.E., F.C.S. New edition, revised and enlarged. Pp. 61. Edinburgh: *The Prescriber* Offices, 13, Glencairn Crescent. Price 4s. 6d.

² "The Science of Shaving." By Homo Sum. Pp. 37. Cambridge: W. Heffer and Sons, Ltd. Price 1s.

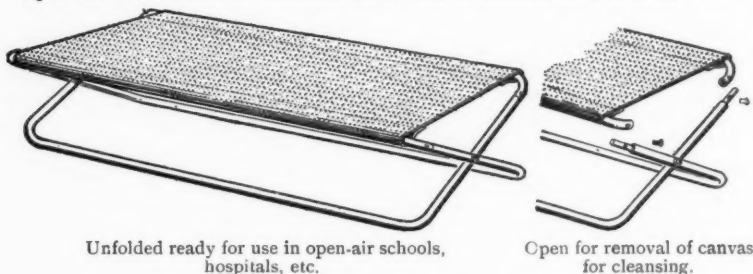
³ "The Blue Book of Gardening." Pp. 402. London: James Carter and Co. (Carter's Tested Seeds, Ltd.), Raynes Park, S.W. 20. Price 1s., post free 1s. 6d.

⁴ "The Rambler's Handbook, being the Official Year Book of the Federation of Rambling Clubs for the Year 1932." Pp. 113. London: E. J. Larby, Ltd., 30, Paternoster Row, E.C. 4. Price 6d.

PREPARATIONS AND APPLIANCES.

HYGIENIC APPLIANCES AND THERAPEUTIC PREPARATIONS.

THE HOSKINS REST FRAME is a novelty in reclining couches.¹ Rest is of the utmost importance in the treatment of disease, and regulated rest periods are essential in the management of tuberculous and delicate subjects. This is particularly the case with children in sanatoria and open-air schools. The Hoskins Rest Frame consists of a folding steel



THE HOSKINS REST FRAME.

framework, and is so constructed as to allow of the ready insertion and removal of the supporting canvas for cleansing. The Rest is strong, portable, and can be carried and stacked readily. It is being extensively used in schools under the London County Council and in other institutions, and is being generally approved.

THE WATSON COMBINED FOLDING FOOT AND LEG REST is a simple, inexpensive, practical appliance which is only to be known and used to be enthusiastically approved both by the sick and the sound.² It should be available to every home and club, and we would particularly commend it to the attention of those responsible for the care of cases in sanatoria, open-air schools, convalescent homes, and for employment anywhere where patients and others will be advantaged by resting the lower extremities. The chief features of this novel and effective appliance are illustrated in the advertisement which will be found in the present issue of this JOURNAL. The Rest is made of dark-stained hardwood or oak with wax finish, and is automatically adjusted to meet the requirements of any user, insuring comfort and rest in an easy position, elevated, free from draughts, and when used in a garden above ground dampness. When not in use the Rest can be folded up and

¹ Particulars as to sizes, etc., with prices regarding the various forms of the Hoskins Rest Frame, can be obtained on application to the manufacturers, Hoskins and Sewell, Ltd., Bordesley, Birmingham; London offices, 53, Curtain Road, E.C. 2.

² The Watson Combined Folding Foot and Leg Rest (Provisional Patent No. 31423) is manufactured by F. G. Watson, Southam S.O., Warwickshire, from whom illustrations and particulars can be obtained on application.

carried or used in a motor-car. It should also be noted that by simply reversing the position of the Rest it makes an admirable Bed Rest. (The price is 5s. 6d.)

THE TERRY SPRING FOOT REST is one of the latest of the many admirable "Terry" novelties which make for health and happiness.¹ It will be appreciated by doctors and others who have to spend much time in a motor-car, for it provides a cleverly constructed support for the feet whereby jars and troublesome vibrations are eliminated. The framework is of oak, with rustless plated-steel fittings. The footboard, overlaid with a rubber tread, is sprung between two rows of extension springs, giving a heel-and-toe movement in addition to a vertical action. The slope varies at will and the footboard swings easily with the motion of the car. For use in the house or out of doors the Foot Rest is of service. (The prices are 10s. 6d., 12s. 6d., and 17s. 6d., according to quality of fitment.)

THE "BESCO" BEACH OR GARDEN REST is a practical British-made novelty which will appeal to all who appreciate the benefits of rest under open-air conditions in the garden, by the seaside, and elsewhere.² It consists of a rubber-proofed stencilled canvas ground-sheet with fixed support for the upper part of the body. The whole equipment can be folded up into a light portable parcel 24 by 6 inches. (Prices 2s. 11d. and 3s. 11d. complete.)

To the series of Feans novelties making for hygienic management and the increased comfort of patients and others, some of which have been noticed in previous issues of this JOURNAL,³ two additional members have recently been added. THE HEDKOZEE cushion is of special shape, form, and composition. It is crescent-shaped, with a recess into which the head can nestle, and horns which rest against the shoulders. This contrivance is artistic in appearance, and can be used anywhere in study, boudoir, bedroom, when motoring, or while resting out of doors. It makes an acceptable present for convalescents or for patients undergoing sanatorium treatment. (Price stuffed, 8s. 9d.; pneumatic, 15s. 6d., post free.) THE FENOVA is a stocking protector which will be welcomed by golfers, tennis-players, and other sportsmen, pedestrians, and all classes of patients. It is made of chamois leather and netting. For persons liable to corns and callosities or chilblains it should prove a boon. Moreover, it is an appliance saving wear and tear and adding to comfort, keeping the feet warm in winter and cool in summer. The "Fenova" is washable. (The price is 2s. 11d. a pair, postage 2d. extra. When ordering, the size of shoe must be given.)

THE SNAPLITE FLASHLITE ELECTRIC TORCHES are pocket and bedside companions which will be specially appreciated by doctors, nurses, and patients.⁴ They provide in small space a brilliant lamp and a three months' battery. (Price 1s. 6d. and 2s. 6d.)

THE "ELBIE" DUSTLESS DUSTERS are sanitary agents which will be appreciated in hospitals and sanatoria, as well as other institutions

¹ Particulars regarding the Terry Spring Foot Rest and other specialities can be obtained from the manufacturers, Herbert Terry and Sons, Ltd., Redditch.

² The "Besco" Beach or Garden Rest is made by Besco Company, Hill Street, Rochdale, Lancs.

³ Particulars regarding the Feans Appliances can be obtained on application to Feans, Ltd., 71, High Holborn, W.C. 1.

⁴ The Snaplite Flashlamps and Torches are supplied by the Burgess Products Company, Bush House, W.C. 2.

and private houses, for they provide for the collection of dust in the fabric and polishing at the same time.¹ The duster can be washed, and is a labour-saving, hygienic, inexpensive contrivance. (Price 1s. each.)

THE IODINE PEN is a serviceable and handy novelty which doctors, nurses, and others will appreciate.² It is a vulcanite tube which can be filled like a fountain-pen with tincture of iodine, and carried in the pocket ready as a first-aid application to accidental cuts and abrasions. (The price is 1s. 6d. and 2s. 6d.)

THE THERMEGA ELECTRO-RADIANT PADS provide appliances which will find favour both with the sick and the sound, and for service in hospitals, sanatoria, and all institutions, as well as in the dwellings of all classes of the community where electric power is available. Doctors everywhere, in addition to those responsible for the management of private households, are appreciating this simple, safe, inexpensive contrivance for the provision of warmth.³ Each appliance is equipped with a thermostat which automatically cuts off the current when the desired temperature is reached and switches it on again when the appliance cools down. There is also a special safety cut-out. The pads are available in two sizes. The larger has a three-heat control which enables the temperature to be adjusted at 100° F., 130° F. or 160° F. as required; while the smaller is set for approximately 120° F. It is evident that these appliances will be of service in many disorders and the treatment of various diseases. An electric blanket is also available for the warming and airing of the whole bed, and this will be invaluable in sanatoria and where patients are undergoing open-air treatment. (The price of the small size of the Thermega is 10s. 6d.)

ELASTOPLAST is the general designation for a new series of elastic plaster bandages, dressings, and other preparations which will be invaluable in the treatment of many varieties of accident, disorder, and disease met with in both hospital and private practice.⁴ The bandages are excellent for the care of chronic ulceration and in many forms of surgical and orthopaedic work needing support. The Viscoparte and Cellona bandages will be of special assistance in certain cases met with in tuberculosis service in sanatoria and dispensaries.

THE KILLWEEDER is a novel weeding tool, which will be welcomed by all in sanatoria and other public institutions, as well as in connection with private dwellings, where lawns have to be kept in good form and free from disfiguring weeds.⁵ The killweeder is of ingenious construction, consisting of a long hollow tube with a cup end, and a valve which opens and closes automatically on pressure being made on the top of the appliance. Special killweed non-poisonous powder is placed within the tool, which is then placed over the weed and liberated so that it falls into the heart of the weed, bringing about its

¹ The "Elbie" Dustless Dusters are manufactured by Batley and Co., Gorsey Works, Upper Brook Street, Stockport.

² The Iodine Pen is supplied by Clay and Abraham, Ltd., 87, Bold Street, Liverpool.

³ Particulars regarding the Thermega Electro-Radiant Pads and Blankets can be obtained from the makers, Thermega, Ltd., 51-53, Victoria Street, S.W. 1.

⁴ An illustrated price list of the Elastoplast specialities can be obtained from the makers, T. J. Smith and Nephew, Ltd., 42, Tavistock Square, W.C. 1.

⁵ Full particulars regarding the Killweeder can be obtained from the makers, Peter Carmichael and Co., Ltd., Grove Road, Balham, S.W. 12.

rapid destruction. This novelty only requires to be known and rightly used to be appreciated.

THE "DOMES OF SILENCE" VERTU CONVERTOR is a practical novelty which will be welcomed in many homes and institutions and by patients and invalids. It is an ingenious contrivance, whereby decorative lamps, vases, and the like can be fitted with a suitable electric-light bulb and artistic shade.¹ The equipment consists of—(1) a domed, metal, electric lamp-holder fitted with silk flex and light plug; (2) a rubber-shod weight, with chain to secure rigidity and correct balance; and (3) a clip-on lamp-shade holder. The convertor can be obtained in four sizes—nickel silver or chromium plated, and in brass, polished and lacquered. (Prices range from 8s. 6d. to 17s. 6d.)

THE "TEK" TOOTHBRUSH is a scientifically devised new form of dental necessity, which should find favour with all concerned with the care of the teeth.² It has a small head fitted with bristles—suitably shaped bristles—and thus all corners and crevices of the teeth can be reached and cleaned. As a means for the conservation of the teeth and gums the "Tek" is admirable. It is most important that tuberculous subjects of all ages should pay special attention to the hygienic management of the mouth, and in this the "Tek" can be relied upon as an effective agent. It is sold protected in a sealed windowed container, and can be obtained with handles in six colours and three degrees in stiffness of bristles. (The price is 2s. each.)

THE PHONYCORD GRAMOPHONE RECORDS will be appreciated in hospitals, sanatoria, schools, and other institutions, as well as for use on all forms of gramophone.³ They are coloured, flexible, light, durable, and inexpensive, and a large variety of subjects is available. (The price is 2s. 6d. each.) A special angle needle has been designed for use with these and other records. (Price 1s. per box of 200.)

The care of the skin is a hygienic necessity not only for the sound but for the sick, and there is no class of case in which greater attention is required than in tuberculous patients. The skin is a complex organ, and occupies a foremost place among the protective, regulative, and nervous structures on which human health and happiness depends. Among the various means whereby effective cutaneous functions can be maintained a place should be given for regulated friction. This can be pleasingly provided by means of HINDES' "TINGLOW" BODY FRICTION BRUSH.⁴ This patented appliance has been approved by doctors, athletes, and others interested in health habits. It is certainly a valuable adjunct for the bath, and affords a ready way for the conduct of body friction both before and after exercise. Pure bristles and reliable rubber sponge (in various colours) have been employed in the construction of the brush, and it can be used dry or with soap and water on any part of the body desired. (The price is—standard size, 5s. 6d.; large size, 8s. 6d.)

The KING TELEPHONE MESSAGE BLOCK will be of much service to

¹ The "Domes of Silence" Vertu Convertor is supplied by "Domes of Silence" (1920), Ltd., Dick Whittington House, 20, College Hill, E.C. 4.

² Particulars regarding the "Tek" Toothbrush can be obtained from Johnson and Johnson (Great Britain), Ltd., Slough, Bucks.

³ Full particulars regarding the Phonycord Records can be obtained on application to Phonycord Limited, 24, Denmark Street, Charing Cross Road, W.C. 2.

⁴ Particulars regarding Hinds' "Tinglow" Body Friction Brush can be obtained from the manufacturers, Hinds, Ltd., Bromsgrove Street, Birmingham.

doctors and others who are constantly receiving messages by telephone.¹ It consists of a strong polished block with rubber feet, into which is fitted a pad with readily detachable paper slips on which notes can be written. (The price is 5s., with refill pads free on demand.)

LACPININE or LAIT DE SAPIN and LACPININ-BALSAM are excellent preparations for the production of medicated baths. Pine Milk, as the former is designated, is not only suitable for ready use in the bath, but can be used for frictions, lotions, douches, and hip baths. It contains a high percentage of pine-needle oil, and as it is free from colouring matter the bath and sponges are not stained and no soiling sediments are left. The Wolo Swiss Pine Bath is prepared with LACPININ-Balsam, a fluorescent balsamic non-alcoholic extract made from conifer oils, which possesses a pleasant odour, and exercises no prejudicial discolouration of skin, bath, or linen. These preparations are manufactured by the well-known Swiss firm of Wolo, Ltd., the headquarters of which are at Zurich.² They will be appreciated not only by patients in hospitals, sanatoria, and in other establishments, but also by sportsmen, travellers and other sound persons for maintaining health and removing the effects of fatigue.

RECKITT'S BATH CUBES add much to the pleasure and profit of the hot bath.³ These little blocks when dissolved in hot water not only provide a soothing, stimulating, perfumed bath, which removes the sense of fatigue, but also soften the water. A cube added to a foot-bath is comforting for weary and painful feet. A portion of a cube may be advantageously added to the first lather when shampooing and later to the water employed in rinsing. The cubes are available in four perfumes—lily-of-the-valley, lavender, verbenia, and essence of flowers. (The price is 2s. per box of a dozen cubes, and in cartons of three and six at 6d. and 1s. respectively.)

ENO'S FRUIT SALT is used extensively as a popular, pleasant, and effective aperient. The manufacturers are now supplying a neat, convenient leather traveller's case of suitable dimensions to hold a handy sized bottle of Eno's, and such as will slip into a corner of a suit-case.⁴

PHANODORM, or Cyclo-hexenyl-ethyl-malonyl-urea, a Bayer product, is one of the safest, most effective, and generally satisfactory of the many synthetic hypnotics now claiming attention.⁵ It appears to have no cumulative action, and produces no undesirable secondary effects, but brings about simple, refreshing sleep with no unpleasant after-effects. Phanodorm is being used with satisfaction in sanatoria for tuberculous subjects troubled with insomnia. It is administered in small tablet form by the mouth.

JUBOL is an effective preparation for the re-education and control of the intestine, preventing constipation and its associated troubles,

¹ The King Telephone Message Block is supplied by J. King and Co., Advertising Agents, 3, Evelyn House, 62, Oxford Street, W. 1.

² Particulars regarding the Wolo Pine Bath Specialities can be obtained from the British Agents, Luce Printamp, Ltd., Kingly Court, 10, Kingly Street, Regent Street, W. 1.

³ Reckitt's Bath Cubes are manufactured by Reckitt and Sons, Ltd., of Hull, with London Offices at 40, Bedford Square, W.C. 1.

⁴ The Eno Traveller's Case is supplied by J. C. Eno, Ltd., 160, Piccadilly, W. 1 (price 5s., post free), while Eno's Fruit Salt can be obtained from any chemist.

⁵ Phanodorm is manufactured at the celebrated Bayer, Hoechst and Behring works by the I. G. Farbenindustrie, A.G., and full particulars can be obtained on application to Bayer Products, Ltd., 19, St. Dunstan's Hill, E.C. 3.

including auto-intoxication.¹ It will be found of service in dealing with many tuberculous cases.

MUSCATOL has long been known and used by both the sick and the sound as a protection against the attacks of mosquitoes, gnats, midges, and other insect pests.² For those undergoing open-air treatment in sanatoria or elsewhere where insects are troublesome Muscatol only needs to be used to be appreciated. It is a non-poisonous, non-greasy, clean, pleasant liquid, which can be readily applied to the skin from the sprinkler-receptacle in which it is supplied. (The price ranges from 2s. to 10s., according to size of bottle.)

FOX'S GLACIER MINTS are an attractive and delicious confection, which, while appealing to the healthy, will be found of real service for many patients, particularly chest cases with troublesome cough and sufferers from irritable throats.³ These novel mints have been popular for eleven years, and have been awarded certificates testifying to their purity and high quality. The makers provide various other forms of sweetmeats, among which special attention should be directed to the Glacier Fruits and Glacier Barley-sugar. The latter is of much service in the treatment of derangements met with in childhood and the control of diabetic subjects.

SKETOLENE is a fragrant, non-greasy, non-staining liquid, which is a protection against the attacks of mosquitoes, gnats, midges, and other biting and stinging flies.⁴ It will be appreciated by patients, sportsmen, and others living an open-air life. (Price 7½d., 1s. 3d., and 2s., post free.)

OXFORD MARMALADE is one of the most popular and appetizing of table delicacies; and while appreciated by the sound and extensively used in athletic circles, it is a preparation particularly suited to the requirements of the tuberculous and others requiring a tonic and a stimulant for a fickle or jaded appetite.⁵ This marmalade is a reliable Seville-orange product, specially manufactured, and rich in nutrient and appetizing elements. The same firm also provide excellent condiments as tempters of appetite, and we would direct attention particularly to the Horseradish Cream and Mint Jelly relishes.

HORLICK'S MALTED MILK provides an ideal nutrient drink for tuberculous patients and all subjects convalescing from acute illnesses or liable through constitutional debility or acquired diseases to suffer impairment in their physical powers.⁶ It is a valuable adjunct in medical practice and for use in sanatoria and like institutions. For tuberculous and tuberculously disposed children it is a nutrient of exceptional value. Expectant and nursing mothers find this prepara-

¹ Particulars and specimens of Jubol may be obtained from the agents for Great Britain and Ireland, Messrs. Spencer and Co., 20, Queen Street, Hammersmith, W. 6.

² Muscatol is supplied solely by Frank A. Rogers, Manufacturer of Medical Sprays, 1, Beaumont Street, W. 1, from whom particulars can be obtained.

³ Particulars regarding the Fox Glacier Specialities can be obtained from the manufacturers, Fox's Glacier Mints, Ltd., Acme Confectionery Works, Oxford Street, Leicester.

⁴ Sketolene is supplied by Stafford Allen and Sons Ltd., Cowper Street, Finsbury, E.C. 2.

⁵ The manufacturers of Oxford Marmalade are Frank Cooper, Ltd., Victoria Works, Oxford.

⁶ Specimens of Horlick's Malted Milk with full particulars can be obtained on application to Horlick's Malted Milk Company, Ltd., Slough, Bucks.

tion invaluable, for it is rich in essential elements. Moreover, it keeps indefinitely in all climates, and can be prepared at a moment's notice and with the minimum of trouble.

Tuberculous and other patients, if they are to be psychologically sustained in the course of their restoration to health, require some form of occupation-therapy which shall be interesting and profitable. One of the most attractive and helpful is provided by learning a new language. This can be readily undertaken in a sanatorium or in the patient's own home by employing the LINGUAPHONE METHOD.¹ Courses of instruction are provided by means of gramophone records suitably graded, which are accompanied by an explanatory instruction handbook. Courses and records are now available in French, German, Italian, Spanish, and other languages, so that all talents and tastes can be met.

The world-renowned firm of Abdulla and Co., Ltd., continue to issue their justly famous specialties in attractive cigarette form and produced from the finest Virginian, Turkish, and cigarette tobacco.² These are available in artistic and serviceable cabinets in gold, blue leather, and other attractive packings, and forming ideal gifts for smoking doctors and others. All the Abdulla cigarettes are of the highest workmanship, and if patients, medical advisers, and others desire to avoid the disabilities arising from the smoking of inferior brands of tobacco and badly constructed cigarettes let them advise and use Abdullas, which can be supplied in forms to meet the requirements of every class of doctor and patient.

¹ Full particulars regarding the various Linguaphone Courses and Records can be obtained from the Linguaphone Institute, 469, Napier House, 24-27, High Holborn, W.C. 1.

² An attractive booklet describing the Abdulla Specialities can be obtained on application to Abdulla and Co., Ltd., 173, New Bond Street, W. 1.

THE OUTLOOK.

THE SPAHLINGER TREATMENT OF TUBERCULOSIS.

M. HENRI SPAHLINGER has sent us a communication "Principles on which the Spahlinger Method of Preparing Specific Antigens are Based." This has been published in *The British Medical Journal*, *The Lancet*, and *The Medical Officer* for February 6, and in subsequent issues has been criticized and discussed. Long ago we visited M. Spahlinger's Institut Bactériothérapique at Carouge, Geneva, and urged that the formula and technique should be published in accordance with approved humanitarian and scientific procedures. Now fresh claims are presented for M. Spahlinger's method of vaccination against tuberculosis, and we understand researches are proceeding, the results of which will be placed before a scientific body at an early date. In view of the world-wide interest taken in M. Spahlinger's work for many years and the present pronouncement, it is to be hoped that means will be found whereby the whole Spahlinger system may be thoroughly investigated by an authoritative scientific body, including recognized tuberculosis experts experienced in the bacteriological, clinical, and public health aspects of the tuberculosis problem.

TUBERCULOSIS AND MEDICAL RESEARCH.

The recently-issued Seventeenth Report of the Medical Research Council is a record of valuable investigations in various fields of scientific medicine.¹ It provides a survey of new advances in nutritional science, particularly knowledge of Vitamin D and especially its relation to dental decay. Progress has been made in the study of virus diseases, and there is a consideration of the common cold. Readers of this JOURNAL will be particularly interested in the section dealing with tuberculosis, which provides an outline of investigations which are being carried out by various workers in different parts of the country, relating to bovine tuberculosis in man, the chemotherapy of tuberculosis, cultural conditions increasing the virulence of B.C.G., strains of tubercle bacilli in the sputum from phthisis cases, culture of tubercle bacilli from milk, antigen properties of the tubercle bacilli, tuberculosis in Wales in relation to racial type and social environment, and the diagnostic use of tuberculin. There is a section on Bovine Tuberculosis in Scotland. Particulars are also given regarding the Dorothy Temple Cross Research Fellowships in Tuberculosis.

¹ Committee of the Privy Council for Medical Research: Report of the Medical Research Council for the Year 1930-1931. Pp. 153. London: His Majesty's Stationery Office. 1932. Price 2s. 6d.

TUBERCULIN TESTS.

The Medical Research Council have recently issued an impressive Report on the Value of Tuberculin Tests in Man, prepared by Dr. P. D'Arcy Hart, of University College, London.¹ It is based on reactions observed in 1,030 clinically tuberculous subjects of all ages. The Council in their Preface testify as follows: "Dr. Hart gives good evidence here that the tuberculin test is one of scientific accuracy provided that the intracutaneous or Mantoux test be used and not the cutaneous test of von Pirquet. The positive reactions are not yet capable of such quantitative grading as might serve to distinguish active tuberculosis, as such, from the benign results of infection that has at some time or another been implanted in most members of an urban population. On the other hand, however, a negative reaction, given adequate dosage of tuberculin, is at all ages of diagnostic value for excluding the presence of tuberculous disease, the error being only about 2 per cent. The negative reaction is most likely to be obtained in children who have not yet become tuberculin-sensitized through chance exposure, and it may, therefore, be of great value for guiding hygienic measures of control in households where a tuberculous patient has been living. The accuracy of the test should make it possible now to obtain trustworthy measurements of the tuberculin sensitization of a population at different ages, and to find whether this is actually falling as a result of modern conditions or modern methods that improve our control of the infection." The Report is divided into two parts—Diagnostic Applications and Epidemiological Applications. Conclusions are effectively summarized in eighteen paragraphs. We quote the last two: No. 17, "Tuberculous infection in London children of the poorer classes appears at the present time to be acquired for the most part in later childhood and adolescence—*i.e.*, during a period when the principal activities of the individual are away from the home. Almost all are sensitive to tuberculin when adult life is reached." No. 18, "Systematic tuberculin tests on children may throw light on a new clinical entity—a transient and benign illness accompanying tuberculous first infection. Owing to the unobtrusive and temporary nature of its symptoms, it is likely that the tuberculous origin of this illness usually escapes recognition. The detection of a positive skin reaction in a previously tuberculin-negative individual may assist in establishing the tuberculous nature of the symptoms."

NOTES AND RECORDS.

The Ministry of Health has issued, as No. 67 of the Reports on Public Health and Medical Subjects, a 15-page pamphlet by Dr. E. J. Wyler, "A Method of Increasing the Sensitiveness of the Wassermann Test" (price 4d.). Report No. 66 deals with "Incurable Cancer," and presents a series of tables and records prepared by Dr. Janet E. Forber (*née* Lane-Claypon), based on an investigation of

¹ "The Value of Tuberculin Tests in Man, with Special Reference to the Intracutaneous Test." By P. D'Arcy Hart, Assistant to the Medical Unit, University College Hospital, London. Pp. 136, with tables, charts, appendices, references. Special Report Series No. 164 of the Privy Council Medical Research Council. London: H.M. Stationery Office. 1932. Price 2s.

hospital patients in Eastern London (price 1s.). The Ministry has also just published a report on "Diet in Poor Law Children's Homes," and a memorandum on "The Criticism and Improvement of Diets" (price 3d. each).

The Twenty-Fifth Annual Report of King Edward VII. Sanatorium, Midhurst, gives, in a series of statistical tables, particulars of 193 patients discharged during the year ending June 30, 1931, with data regarding ultimate results relating to patients treated since the year 1906-07. (A copy may be obtained, price 1s. post free, on application to the Sanatorium.)

Vol. 79 of "Studies from the Rockefeller Institute for Medical Research," York Avenue and 66th Street, New York, is a 626-page volume of reprints of chemical, biological, bacteriological, clinical, and other studies including researches on psittacosis.

"Birth Control and Public Health" is a 46-page booklet, with a Preface by Professor Julian S. Huxley, M.A., giving a Report on ten years' work of the Society for the Provision of Birth Control Clinics, the headquarters of which are at the Walworth Women's Welfare Centre, 153a, East Street, S.E. 17. (Price 1s.)

Wireless equipment is now an indispensable part of practically every sanatorium, and all interested in broadcasting should secure a copy of the excellent B.B.C. Year Book.¹ This annual, charmingly illustrated and dealing with all aspects of B.B.C. work, contains an account of the new Broadcasting House and a series of Programme Notes. All who have participated in the production of this admirable work are to be congratulated. Everyone who listens-in should possess a copy.

Messrs. F. Newberry and Sons, Ltd., 31-33 Banner Street, E.C. 1, have favoured us with a copy of the 1932 issue of "Warner's Calendar of Medical History," prepared by William R. Warner and Co., Inc., 113, West 18th Street, New York City. This unique and most informing form of Diary and Engagement Record Book is one which will specially appeal to medical men and women interested in the history of medicine.

Messrs. Scott and Bowne, Ltd., of Scott's Emulsion fame, have issued from their headquarters, 10-11, Stonecutter Street, E.C. 4, the 1932 issue of their admirable "Medical Diary and Emergency Note-Book," a pocket companion which every medical practitioner should possess.

The Pocket Graduate Medical Journal, the official organ of the Fellowship of Medicine, the headquarters of which are at 1, Wimpole Street, W. 1, in its new form, is a publication which should be read by all medicals desiring to keep up to date. The annual subscription is 12s. Dr. L. S. T. Burrell contributes to the current issue a serviceable article on "Technique for the Induction of Artificial Pneumotherapy."

The March issue of *Hygeia*, the Health Magazine, published by the American Medical Association, 535, North Dearborn Street, Chicago, contains an illustrated article by Dr. Claude Lillingston on Robert Koch, and also a description of Preston Hall, the sanatorium of the British Legion Village in Kent, by Dr. J. B. McDougall.

¹ "The B.B.C. Year Book, 1932: The Programme Year covered from November 1, 1930, to October 31, 1931." Pp. 480, with illustrations. London: The British Broadcasting Corporation, Broadcasting House, W. 1. 1931. Price 2s.

A valuable leader furnishing "A Survey of B.C.G. Vaccination" appeared in *The British Medical Journal* for February 27.

A Symposium on the Fiftieth Anniversary of the discovery of the tubercle bacillus was held at the East London Children's Hospital, Shadwell, on March 11, when addresses were given by Sir Percival Hartley, Sir Henry Gauvain, Dr. Jane Walker, Dr. A. S. MacNalty, and Dr. Hartley Williams.

This year's Ideal Home Exhibition, organized by the *Daily Mail*, is being held at Olympia, April 5-30, and should be visited by doctors, hygienists, and all interested in home and health betterment. The gardens and exhibits relating to open-air life are of special interest and service.

The next examination for the Tuberculous Diseases Diploma (Wales) will take place at Cardiff on June 1, 2, and 3. Further information can be obtained on application to the Secretary, Medical School, Cardiff.

In connection with the Belfast Congress of the Royal Institute of Public Health, May 10-15, there will be an important section on Tuberculosis, the Presidents being Sir R. Dawson Bates and Dr. Jane Walker.

The Second International Conference of Social Work is to be held at Frankfurt, in Germany, July 11-14. Particulars can be obtained from the British National Committee, 16, Denison House, 296, Vauxhall Bridge Road, S.W. 1.

The Eighteenth Annual Conference of the National Association for the Prevention of Tuberculosis will be held in London July 21-23.

The Edinburgh Medical Journal for March contains a series of papers presented to the Tuberculosis Society of Scotland.

The American Review of Tuberculosis for March provides an English version of Koch's classic paper on "The *Ætiology of Tuberculosis*," with an introduction by Dr. Allen K. Krause and reproductions of Koch's portrait and original illustrations. This is now available in booklet form.

The *Zeitschrift für Tuberculose*, vol. 64, parts 1 and 2, by J. A. Barth, 18B, Salomonstrasse, Leipzig, forms a special Robert Koch issue. It presents a portrait of Koch with two facsimile letters. There are also original papers by E. von Romberg and Sauerbruch of Munich, Sir Robert Philip of Edinburgh, Calmette and Léon Bernard of Paris, Bruno Lange of Berlin, Bang of Copenhagen, A. Stanley Griffith of Cambridge, and other tuberculosis workers (the price is RM. 10).

The Southern Railway has issued under the title of "Hints for Holidays" (price 6d.) an official guide to health and pleasure resorts, finely illustrated and full of references and with information which will be invaluable to medical and other advisers.